

PLANNING GUIDES  
MEMORANDA  
PAMPHLETS  
TRAINING GUIDES



Prepared by the Training Section

U. S. Office of Civilian Defense



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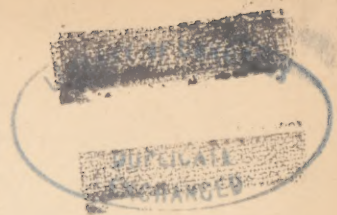


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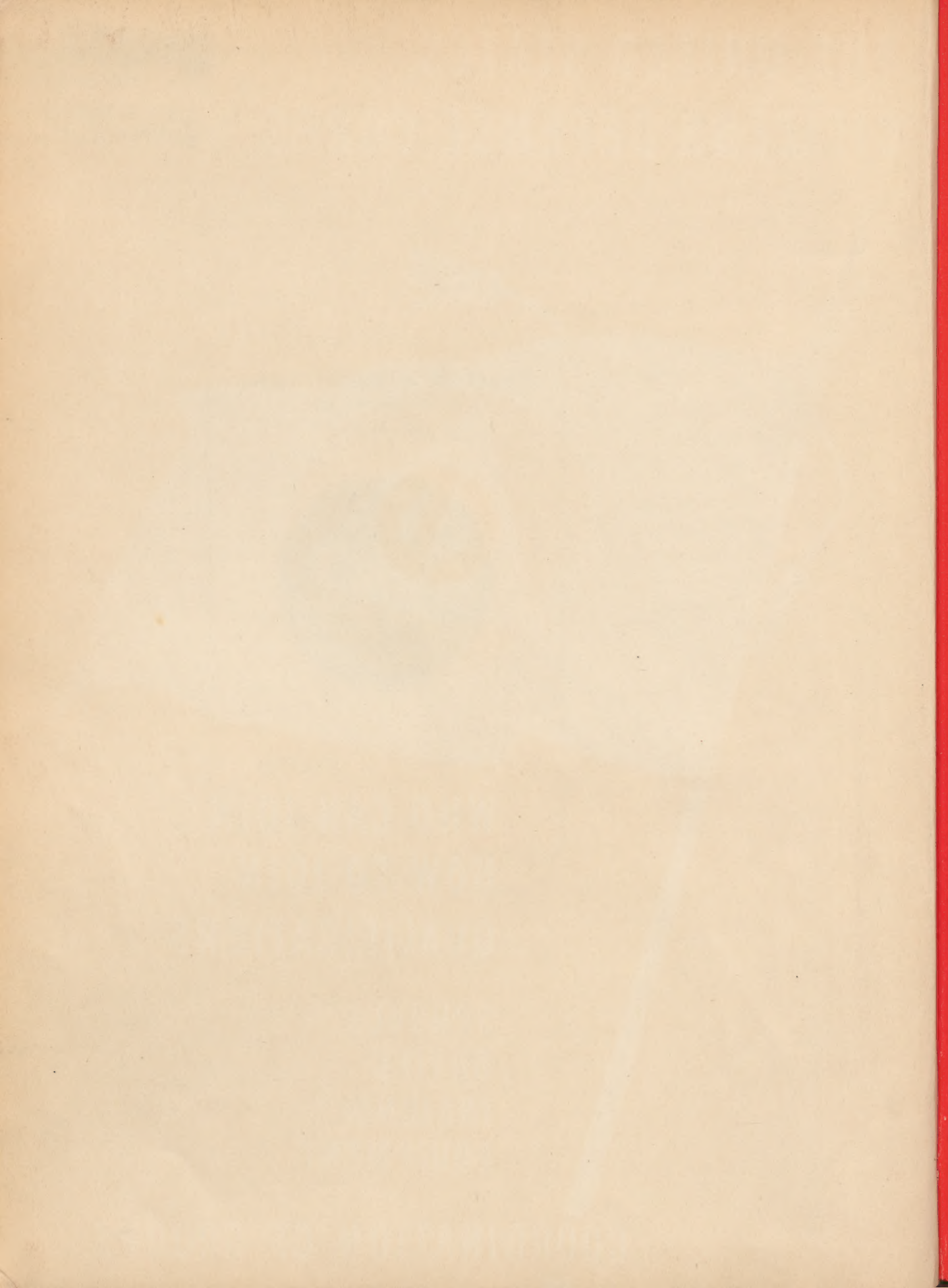
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(Revised June 13, 1936)









# THE UNITED STATES CITIZENS DEFENSE CORPS



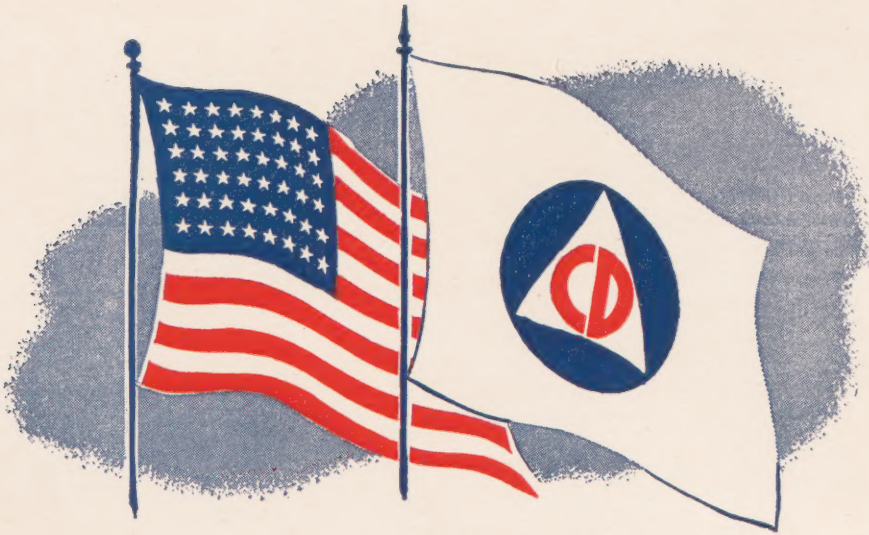
WHO CAN JOIN  
HOW TO JOIN  
QUALIFICATIONS

SCHOOLS  
DUTIES  
INSIGNIA  
EQUIPMENT

LSCC

COORDINATION OF GROUPS

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# U. S. Citizens Defense Corps

**Who Should Join.**—All able-bodied, responsible persons in the community—men and women, housewives, laborers, business and professional people—for the mutual protection of all. Boys and girls, and elderly people too, have work to do. The program is broad; the tasks are many; the time is now!

For percentages of workers per thousand population..... See pages 3-28

**How to Join.**—All persons should visit and offer their services to the local "Civilian Defense Volunteer Office" or, if it has not yet been established, direct to the local Civilian Defense Council. If neither organization is available, patriotic residents should call upon their mayor and discuss the need for organization.

**Qualifications** for membership require enrollment, physical and mental aptitude, recognition of obligation to study duties, take required training courses, and subsequently attend periodical group practice..... See pages 3-28

Physical requirements..... See page 38

**Schools and Training** should be organized locally and all members of each group are expected to study and attend training courses..... See page 35

Recommended training pamphlets..... See pages 3-28

Sample certificate of training..... See page 36

**Duties** are numerous.—A separate group is assigned to each classification of duty.  
See pages 3-28

**Insignia** have been designed to distinguish each group or branch. Arm bands and cloth and metal ornaments for uniforms or civilian dress are permitted only for enrolled workers who have satisfactorily *completed training courses*.

For descriptions of insignia..... See pages 29, 30, 31

For methods of purchase..... See page 32

**Equipment** varies according to duties of different groups; for suggestions see chart... Page 33

**Coordination of Groups.**—See chart of "Civilian Protection Organization for a Municipality"..... Page 34

Periodical combined group practice..... See page 37





## Basic Insigne

This basic insigne represents *all* civilian defense. Its use in any official form (except on flags or banners) is confined to enrolled civilian defense workers who have successfully completed prescribed training courses. Only such qualified persons may wear it in any "official" manner.

It is for all uniform collar and cap ornaments (except Nurses' Aides)—enameled on metal or embroidered on cloth—on automobile plates, on flags and banners—on civilian-dress lapel buttons. On steel or fire helmets it can be stenciled, front center.

When superimposed on the letters "U. S." it becomes the Federal Staff Insigne.

When shown immediately above a State designation it becomes the State (or local organization therein) Staff Insigne.

On arm bands it is used only in the staff combinations as above.

On uniform sleeve insignia it is used only in the staff combinations as above.

On civilian-dress lapel buttons it can be worn in the staff combinations above—

By respective staff members, or alone with no U. S. or State designations by all enrolled certified C. D. workers.

On uniform collar and cap ornaments it is to be worn *alone* with no Federal or State designations.

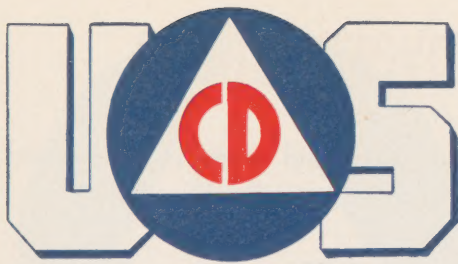
On flags for headquarters and official automobiles it can be used "officially" with stars or pyramids appropriate to the rank of the commander of the headquarters or owner of the car.

On flags and banners used for display only, it can be used alone as shown on the cover of this booklet. There is no restriction on use in this manner by any persons.

It is protected by U. S. Letters Patent D-129,797.

See page 32 for methods of purchase.





# Staff Corps

**Personnel.**—Men and women should be “executive” type—dependable, capable of long hours in emergencies.

## Percentages of Workers Necessary per 1,000 of Population—

Men	Women	Youths
4	2	0

**Duties.**—A. Command.  
B. Workers—typing, records, switchboard, general office duties.

## School and Training Courses Required—

First Aid	Fire Defense	Gas Defense	General	Drill
Hours, 10	3	2	5	2

**Periodical Group Practice.**—Individual workers must be *trained*, groups must be *organized*, groups must practice as *groups*. This is particularly true of staff corps: Certain emergencies might call for service of only a few, not all, of the different groups, but the staff corps goes into action on *all* calls.

Minimum staff corps practice should consist of—*Hours*—2. *Period*—Weekly. This schedule should be continued during the entire period of the national emergency.

**Recommended Training Pamphlets.**—Staff corps should familiarize themselves with all pamphlets described in following pages so that they can coordinate and direct, with understanding, the work of all groups. Of special significance is the “Staff Manual.”

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons only.

**Restrictions for Wear.**—Only enrolled staff members and workers who have successfully completed training courses listed above may wear insignia on uniforms, arm bands, civilian-dress lapel buttons or in any “official” manner. Such persons must be officers of or workers on the staffs of—

The Office of Civilian Defense, Washington, D. C. } For “U. S.” staff insignie.  
Civilian Defense Regional Directors.

The various State Civilian Defense Councils } For State staff insignie.  
The various local Civilian Defense Councils }

This insignie is protected by U. S. Letters Patent D-129,812.

See page 32 for methods of purchase.





# Drivers Corps

**Personnel.**—Men and women—experienced drivers—good vision.

## **Percentages of Workers Necessary per 1,000 of Population—**

Men	Women	Youths
	5	

**Duties.**—Persons willing to offer their cars as well as their own time are required. Women are often enrolled for this work. Organization by sectional groups, with a Coordinator of Transportation in control, is suggested. Cars and drivers are assigned by the Coordinator to First Aid Squads, Casualty Stations, Control and Message Centers, and to the Staff of the Local Defense Coordinator. Instruction in driving under blackout and other air raid conditions is necessary.

## **School and Training Courses Required—**

	First Aid	Fire Defense	Gas Defense	General	Drill
Hours,	10	0	5	5	2

**Periodical Group Practice.**—Individual workers must be *trained* as above: Groups must be *organized*, groups must practice as *groups*. The Drivers Corps should meet at least twice a month if not called more often. *Hours*—2. *Periods*—bimonthly.

They should make emergency parking arrangements—securing trucks assigned to them, driving and parking in groups, etc.

**Recommended Training Pamphlets.**—“Blackouts,” “A Training Guide for Emergency Drivers,” “Handbook for Emergency Drivers,” “Protection Against Gas,” “Handbook of First Aid.”

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel button only.



DRIVERS CORPS

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated as members of “Drivers Corps” may wear this insignia on uniforms, arm bands, civilian-dress lapel buttons or in any “official” manner.

This insignia is protected by U. S. Letters Patent D-129,808. See page 32 for methods of purchase.





# Messengers

**Personnel.**—Young women—boys and girls (15 to 21 years)—should be able to ride bicycle or motorcycle.

## **Percentages of Workers Necessary per 1,000 of Population—**

<i>Men</i>	<i>Women</i>	<i>Youths</i>
1	1	6

**Duties.**—A reliable and efficient messenger group is vital to organization for civilian defense. Messengers are assigned to Air Raid Warden posts, to Control and Message Centers, to hospitals and First Aid posts, to fire stations, and police precincts. Under a rain of bombs, other communications may break down, but the messenger will somehow get the message through.

## **School and Training Courses Required—**

	<i>First Aid</i>	<i>Fire Defense</i>	<i>Gas Defense</i>	<i>General</i>	<i>Drill</i>
Hours,	10	3	2	5	2

**Periodical Group Practice.**—Individual workers must be *trained*, groups must be *organized*, groups must practice as *groups*. This is particularly true of messengers. Messengers should practice assembling at call at different points—relaying messages—reporting verbal messages. Minimum messengers' practice should consist of—*Hours*—2. *Period*—Bimonthly.

**Recommended Training Pamphlets.**—"Protection Against Gas," "Fire Protection," "First Aid in Prevention and Treatment of Chemical Casualties," "Blackouts."

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated "Messengers" may wear this insigne on uniforms, arm bands, civilian-dress lapel buttons, or in any "official" manner.

This insigne is protected by U. S. Letters Patent D-129,806.  
See page 32 for methods of purchase.



MESSENGERS



4. 13





# Rescue Squads

**Personnel.**—Men—husky, resourceful, fearless.

## **Percentages of Workers Necessary per 1,000 of Population—**

<i>Men</i>	<i>Women</i>	<i>Youths</i>
2		

**Duties.**—Air attacks provide special problems. Such responsibilities fall upon the Public Works, Fire, and other appropriate municipal departments. Rescue Squads must be organized to supplement these organizations, to rescue persons trapped in debris, and to shut off broken gas, electric, and water lines. Each squad consists of about 10 men, equipped with suitable protective clothing and the necessary tools and equipment for shoring up, tunneling, and minor demolition work, and for rendering emergency first aid.

## **School and Training Courses Required—**

	<i>First Aid</i>	<i>Fire Defense</i>	<i>Gas Defense</i>	<i>General</i>	<i>Drill</i>
Hours,	20	10	5	5	2

**Periodical Group Practice.**—Individual workers must be *trained*, groups must be *organized*, groups must practice as *groups*. Group Rescue Squad practice, including assembly at designated points with equipment, should be on the following minimum schedule: *Hours*—2. *Periods*—Weekly.

**Recommended Training Pamphlets.**—“A Training Course for Rescue Squads,” “A Handbook for Rescue Squads,” “Fire Protection,” “Protection Against Gas,” “Handbook of First Aid.”

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons only.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated as members of “Rescue Squads” may wear this insignia on uniforms, arm bands, civilian-dress lapel buttons, or in any “official” manner.

This insignia is protected by U. S. Letters Patent D-129,800.  
See page 32 for methods of purchase.



RESCUE SQUAD









# Auxiliary Police

**Personnel.**—Men—strong, good discipline, capable of commanding respect. May be enrolled direct by Police Department.

## Percentages of Workers Necessary per 1,000 of Population—

Men	Women	Youths
4		

**Duties.**—Police functions in which volunteers assist include: (1) Enforcement of emergency restrictions on lighting and prohibitions on trespassing; (2) guarding of docks, bridges, and factories to prevent sabotage; (3) traffic duty to facilitate movement of essential vehicles; (4) prevention of looting of partially demolished shops and homes; (5) assistance to air raid protection services before, during, and after a raid—assist police, enforce blackout, special guards, traffic control.

## School and Training Courses Required—

	First Aid	Fire Defense	Gas Defense	General	Drill
Hours,	10	3	5	5	5

**Periodical Group Practice.**—Individual workers must be *trained*, groups must be *organized*, groups must practice as *groups*. Group practice for Auxiliary Police, carried out under direction of local Police Chief and graduates of Training Schools should be scheduled on the following minimum basis: *Hours*—2: *Period*—Weekly.

**Recommended Training Pamphlets.**—“Blackouts,” “Protection Against Gas,” “Fire Protection,” “First Aid in Prevention and Treatment of Chemical Casualties,” “A Training Course for Auxiliary Police,” “Handbook for Auxiliary Police.”

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons only.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated “Auxiliary Police” may wear this insigne on uniforms, arm bands, civilian-dress lapel buttons, or in any “official” manner.

This insigne is protected by U. S. Letters Patent D-129,803.  
See page 32 for methods of purchase.



AUXILIARY POLICE



BOMB REMOVAL  
SQUAD





# Bomb Squads

**Personnel.**—Men, usually selected from regular police for their special knowledge and training. May be enrolled direct by Police Department.

## **Percentages of Workers Necessary per 1,000 of Population—**

Men	Women	Youths
1		

**Duties.**—Some of the bombs dropped in a modern air attack may fail to explode or may have delayed-action fuses. They must be removed at once to a place where they may be exploded without harm. Since this work requires an unusual degree of knowledge, skill, and devotion, it usually falls to a small group of picked men of the regular police force who have been carefully trained for this dangerous work.

## **School and Training Courses Required—**

	First Aid	Fire Defense	Gas Defense	General	Drill
Hours,	10	0	2	5	2

**Periodical Group Practice.**—Individual workers must be *trained*, groups must be *organized*, groups must practice as *groups*. Bomb Squads group practice under direction of Police Chief and training school graduates should be thoroughly coordinated with assembling of equipment, trucks, etc.

Minimum time required for group practice: *Hours*—2. *Period*—Monthly.

**Recommended Training Pamphlets.**—“Protection Against Gas,” “First Aid in Prevention and Treatment of Chemical Casualties,” “A Training Course for Bomb Squads,” “Handbook for Bomb Squads,” “Blackouts.”

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated as members of “Bomb Squads” may wear this insigne on uniforms, arm bands, civilian-dress lapel buttons, or in any “official” manner.

This insigne is protected by U. S. Letters Patent D-129,799.

See page 32 for methods of purchase.



BOMB SQUADS







# Air Raid Wardens

**Personnel.**—Men and women—natural leaders who inspire confidence.

## **Percentages of Workers Necessary per 1,000 of Population—**

<i>Men</i>	<i>Women</i>	<i>Youths</i>
6	2	

**Duties.**—The Air Raid Wardens are to many people the personal representatives of Civilian Defense. They are not policemen and do not have police powers, but usually function as part of the police force and with its help.

An Air Raid Warden's post is organized to serve a unit of 500 people. It is accessible and plainly marked. Since at least one person is always on duty, four Air Raid Wardens usually are assigned to each post.

The Air Raid Warden's duties include: (1) Observing lights showing during a blackout and warning occupants of the building; (2) directing persons in the streets to shelter; (3) reporting to the Control Center any fallen bombs; (4) reporting fires to the Control Center and assisting in fighting incendiary bombs as soon as they fall; (5) detecting and reporting to the Control Center the presence of gas; (6) administering elementary first aid; (7) assisting victims in damaged buildings; (8) to set an example of cool efficiency under all conditions.

## **School and Training Courses Required—**

	<i>First Aid</i>	<i>Fire Defense</i>	<i>Gas Defense</i>	<i>General</i>	<i>Drill</i>
Hours,	10	3	5	5	2

**Recommended Training Pamphlets.**—"Blackouts," "Protection Against Gas," "Fire Protection," "First Aid in Prevention and Treatment of Chemical Casualties," "A Training Course for Air Raid Wardens," "A Handbook for Air Raid Wardens."

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated "Air Raid Wardens" may wear this insignia on uniforms, arm bands, civilian-dress lapel buttons, or in any "official" manner.

This insignia is protected by U. S. Letters Patent D-129,801.

See page 32 for methods of purchase.



AIR RAID WARDEN







# Auxiliary Firemen

**Personnel.**—Men—strong, agile, good endurance, courageous. May be enrolled direct by Fire Department.

## Percentages of Workers Necessary per 1,000 of Population—

Men	Women	Youths
4		

**Duties.**—Since fire is one of the greatest threats in air attack, augmentation of the regular fire-fighting forces is necessary. A practical plan, used in Britain and already under way in a number of American cities, is the establishment of three auxiliary fire stations around each existing engine company. One officer or first-grade fireman is placed in charge of each auxiliary fire station and up to 30 enrolled volunteers, assigned on the platoon system, are allotted to each such station.

Their duties are similar to those of the regular fire-fighting forces—laying hose relays, operating small pumpers, and assisting the regular fire forces. They should equip themselves with suitable protective clothing similar to that worn by the regular forces.

## School and Training Courses Required—

	First Aid	Fire Defense	Gas Defense	General	Drill
Hours,	10	10	2	5	5

**Periodical Group Practice.**—Individual workers must be *trained*, groups must be *organized*, groups must practice as *groups*. Auxiliary Fire Group practice is carried out under instruction of Fire Chief and graduates. Local schools should be carefully coordinated with work of the regular fire department.

Minimum time considered necessary practice: *Hours*—2. *Periods*—Weekly.

**Recommended Training Pamphlets.**—“Fire Series No. 1,” “Protection Against Gas,” “Fire Protection,” “A Training Course for Auxiliary Firemen,” “Handbook for Auxiliary Firemen.”

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons only.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated “Auxiliary Firemen” may wear this insignia on uniforms, arm bands, civilian-dress lapel buttons, or in any “official” manner.

This insignia is protected by U. S. Letters Patent D-129,802. See page 32 for methods of purchase.



AUXILIARY FIRE CORPS







# Fire Watchers

**Personnel.**—Men—alert, keen, fast reflexes, age not over-important. May be enrolled direct by fire department.

## **Percentages of Workers Necessary per 1,000 of Population—**

<i>Men</i>	<i>Women</i>	<i>Youths</i>
10		

**Duties.**—The menace of the fire bomb calls for unceasing vigilance and prompt, intelligent action. Fighting incendiary bombs as they fall is a duty in which all able-bodied citizens need training.

After the Fire Department has trained its own auxiliary forces, it instructs citizens in the area, under each Air Raid Warden's post, in the method of fighting fire bombs. The Air Raid Warden of each post then selects and enrolls the most alert and suitable persons to act as Fire Watchers. During an air raid alarm, the Watchers take up posts on roofs, in doorways, and at other vantage points in order to spot and reach fallen bombs quickly.

## **School and Training Courses Required—**

	<i>First Aid</i>	<i>Fire Defense</i>	<i>Gas Defense</i>	<i>General</i>	<i>Drill</i>
Hours,	0	3	2	5	2

**Recommended Training Pamphlets.**—"Protection Against Gas," "Fire Protection" "Handbook for Fire Watchers," "Blackouts."

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel button only.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated "Fire Watchers" may wear this insigne on uniforms, arm bands, civilian-dress lapel buttons, or in any "official" manner.

This insigne is protected by U. S. Letters Patent D-129,807.

See page 32 for methods of purchase.



FIRE WATCHER







# Demolition and Clearance Crews

**Personnel.**—Men—husky, dependable.

**Percentages of Workers Necessary per 1,000 of Population—**

Men	Women	Youths
2		

**Duties.**—After an air raid, streets may be filled with rubble, walls of partially demolished buildings may tilt dangerously, and streets may be blocked by bomb craters. Husky crews of enrolled volunteers, added to existing clearance forces, remove rubble from the streets and fill craters made by bombs or broken pavements. They are provided with equipment to raze unsafe walls and buildings. These crews operate ordinarily under the Public Works Department.

## School and Training Courses Required—

	First Aid	Fire Defense	Gas Defense	General	Drill
Hours,	0	3	2	5	2

**Periodical Group Practice.**—Individual workers must be *trained*, groups must be *organized*, groups must practice as *groups*. Group practice should be particularized on system and working control under adverse conditions, gas, noise, etc.

Minimum time for group practice should be—*Hours*—2. *Period*—Bimonthly.

**Recommended Training Pamphlets.**—“Protection Against Gas,” “Fire Protection,” “A Training Course for Demolition and Clearance Crews,” “Handbook for Demolition and Clearance Crews.”

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons only.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated as members of “Demolition and Clearance Crews” may wear this insigne on uniforms, arm bands, civilian dress lapel buttons, or in any “official” manner.

This insigne is protected by U. S. Letters Patent D-129,804.

See page 32 for methods of purchase.



DEMOLITION CREW







# Road Repair Crews

**Personnel.**—Men—husky, capable heavy work, long hours.

**Percentages of Workers Necessary per 1,000 of Population—**

Men	Women	Youths
2		

**Duties.**—Street or Road Repair Crews, augmented by civilian volunteers, restore normal flow of traffic as rapidly as possible after an air raid. These crews operate ordinarily under the Street or Public Works Department following up the rough clearance of the demolition crews. They smooth the road surfaces, repave with available material and restore road markings, fill holes, apply top dressing.

**School and Training Courses Required—**

	First Aid	Fire Defense	Gas Defense	General	Drill
Hours,	0	3	2	5	2

**Recommended Training Pamphlets.**—"Fire Protection," "Protection Against Gas," "A Training Course for Demolition and Clearance Crews," and "Road Repair Crews."

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons only.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated as members of "Road Repair Crews" may wear this insignie on uniforms, arm bands, civilian-dress lapel buttons, or in any "official" manner.

This insignie is protected by U. S. Letters Patent D-129,805.  
See page 32 for methods of purchase.



ROAD REPAIR CREW







# Decontamination Squads

**Personnel.**—Men—sturdy, dependable, age not over-important.

## **Percentages of Workers Necessary per 1,000 of Population—**

Men	Women	Youths
1		

**Duties.**—The possibility that an attacking enemy may use war gas makes a Decontamination Squad necessary. Provision must be made for special treatment of clothing and equipment and also for chemical neutralization of streets and walls contaminated by the persistent liquids known as “blister gases” or vesicants. Specialized training and equipment are needed for this work. Instructors for the local defense organization receive training at Civilian Defense schools conducted by the War Department. The Health Department is particularly concerned with decontamination work.

## **School and Training Courses Required—**

	First Aid	Fire Defense	Gas Defense	General	Drill
Hours,	10	0	5	5	2

**Periodical Group Practice.**—Individual workers must be *trained*, groups must be *organized*, groups must practice as *groups*. Decontamination Squads group practice is important to team work between its different members in handling chemicals, controlling, loading equipment, etc.

Minimum practice time required: *Hours*—2. *Periods*—Bimonthly.

**Recommended Training Pamphlets.**—“Protection Against Gas,” “First Aid in Prevention and Treatment of Chemical Casualties,” “A Training Course for Decontamination Squads,” “Handbook for Decontamination Squads.”

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel button only.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated as members of “Decontamination Squads” may wear this insigne on uniforms, arm bands, civilian-dress lapel buttons, or in any “official” manner.

This insigne is protected by U. S. Letters Patent D-129,810.

See page 32 for methods of purchase.



DECONTAMINATION SQUADS







# Emergency Food and Housing Corps

**Personnel.**—Men and women—strong, capable, long hours, sympathetic.

**Percentages of Workers Necessary per 1,000 of Population—**

Men	Women	Youths
	1	

**Duties.**—Food and shelter must be provided for those whose homes have been damaged or destroyed by air raid or other disaster. Usually the Welfare Department has general responsibility for coordinating such emergency services. It is assisted by enrolled personnel and private organizations equipped to render assistance.

## **School and Training Courses Required—**

	First Aid	Fire Defense	Gas Defense	General	Drill
Hours,	10	0	3	5	20

**Periodical Group Practice.**—Individual workers must be *trained*, groups must be *organized*, groups must practice as *groups*. Emergency Food and Housing Corps require concentrated practice until proficient as teams of menu planners, purchasers, cooks, driers, washers, etc.

Minimum time should be—*Hours*—3. *Period*—Bimonthly.

**Recommended Training Pamphlets.**—“First Aid in Prevention and Treatment of Chemical Casualties,” “Protection Against Gas,” “Red Cross Canteen Course.”

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel buttons only.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated as members of “Emergency Food and Housing Corps” may wear this insigne on uniforms, arm bands, civilian-dress lapel buttons, or in any “official” manner.



EMERGENCY FOOD AND HOUSING

This insigne is protected by U. S. Letters Patent D-129,809.  
See page 32 for methods of purchase.







# The Medical Corps

**Personnel.**—Doctors, nurses, nurses aides or orderlies.

**Percentages of Workers Necessary per 1,000 of Population—**

<i>Men</i>	<i>Women</i>	<i>Youths</i>
1	2	

**Duties.**—In the event of an air raid or any other disaster, the emergency care of the injured will be the responsibility of Emergency Medical Field Units. These Field Units are organized by hospitals and are composed of squads of physicians, nurses, and nursing auxiliaries. Upon receiving orders from the Control Center, a medical squad or squads will proceed to the scene of the disaster and will set up a Casualty Station at a designated site. When necessary, a team of one or more physicians, nurses, and nurses' aides may be dispatched from the Casualty Station to establish an advanced First Aid post close to the site of disaster.

The insigne will be the Caduceus on the basic OCD design.

## **School and Training Courses Required—**

	<i>First Aid</i>	<i>Fire Defense</i>	<i>Gas Defense</i>	<i>General</i>	<i>Drill</i>
Hours,	10	0	2	5	2

**Recommended Training Pamphlets.**—"Protection Against Gas," "Handbook of First Aid," "Textbook of First Aid," American Red Cross.

**Types of Insignia.**—Arm bands, uniform sleeve insignia, collar and cap ornaments, and civilian-dress lapel button only.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated as members of "Medical Corps" may wear this insigne on uniforms, arm bands, civilian-dress lapel buttons, or in any "official" manner.



MEDICAL CORPS

This insigne is protected by U. S. Letters Patent D-129,811.

See page 32 for methods of purchase.



# Nurses' Aides Corps

**Personnel.**—Women, intelligent, physically strong.

## **Percentages of Workers Necessary per 1,000 of Population—**

Men	Women	Youths
	6	

**Duties.**—Volunteer Nurses' Aides are intended to assist the nurse so that she may be able to serve a greater number of patients. Special training by the American Red Cross is necessary before women volunteers can serve in this field. Upon completion of this course of training, which has been prepared by the Office of Civilian Defense in collaboration with the American National Red Cross, Volunteer Nurses' Aides will become eligible to assist nurses in wards and out-patient clinics of hospitals, public health services, and will be assigned to Emergency Medical Field Units for duty in Casualty Stations and First Aid Posts.

## **School and Training Courses Required—**

	Spec. Amer. Red Cross	First Aid	Gas Defense	General	Drill
Hours,	80	20	2	5	2

**Recommended Training Pamphlets.**—"Protection Against Gas," "A Training Guide for Nurses' Aides," "Handbook of First Aid," "Textbook of First Aid," American Red Cross, and special pamphlets from American Red Cross.

**Types of Insignia.**—Sleeve and cap insignia, embroidered cloth only. Nurses' Aides who are members of Emergency Medical Field Units may wear the Caduceus symbol of Civilian Defense.

**Restrictions for Wear.**—Only enrolled workers who have satisfactorily completed training courses listed above and who have been properly designated as members of "Nurses' Aides Corps" may wear this insignia on uniforms, arm bands, civilian-dress lapel buttons or in any "official" manner.



NURSES' AIDES CORPS

This insignia is protected by U. S. Letters Patent D-129,798. Purchase of all Nurses' Aides insignia and uniforms is to be made through the American Red Cross.



# Specifications for Insignia of Civilian Defense

**Arm Band Specifications.**—Durable, washable white cloth bands, 5 inches deep and 18 inches long. Insignia in center of band, 4 inches in diameter. Embroidered in two colors, blue and red on the white or die cut felt, stitched or permanently adhered. All insignia except basic “CD” are included for arm bands. State and Local Staff Corps arm bands differ from the foregoing as follows: The basic “CD” insigne, not including “U. S.,” 4 inches in diameter, is to be attached to the arm band at the top edge, center. Initials, or State abbreviations such as S. C. for South Carolina, or Mass. for Massachusetts, are to appear below the basic “CD” insigne, such letters running in a horizontal line on the arm band. State designations are required only on the basic “CD” insigne for exclusive Staff Corps use. State designations may be applied on all other designs where State Defense Councils so decide but are not required by O. C. D.

**Uniform Sleeve Insignia.**—Same as arm bands except without white band. Should be sewn on upper left sleeve one inch below seam of coat. All insignia except basic “CD” are included in arm bands. State and local Staff Corps insignia differ from the foregoing as follows: The basic “CD” insigne, not including “U. S.,” 4 inches in diameter, is to be supplemented with State initials or abbreviations *below* the basic insigne: The letters should be in a horizontal line centered below the bottom edge of the circle of the basic insigne. State designations are required only on the basic “CD” insigne for exclusive Staff Corps use. State designations may be applied on all other designs where State Defense Councils so decide, but are not required by O. C. D.

**Collar and Cap Embroidered Ornaments.**—One and one-fourth inches in diameter. Embroidered in red, white, and blue. Stitched or rolled edges. Only basic “CD” insignia to be worn as collar and cap ornaments. Collar ornaments to be worn on both lapels on uniforms. No State designations are to be added to uniform collar and cap ornaments. (This is to prevent confusion with the State staff insigne.)

**Collar and Cap Metal Ornaments.**—Same size and specifications as “Collar and Cap Embroidered Ornaments.” Enameled in red, white, and blue. Three coats each color, hard fired.

**Civilian-Dress Lapel Buttons.**—Metal, one-half inch in diameter. Other specifications same as metal and collar and cap ornaments—all insignia include in civilian-dress lapel buttons, example, “Nurses Aide.” State and Local Staff Corps buttons differ from the foregoing as follows: The basic “CD” insigne, not including “U. S.,” one-half inch in diameter, is to be supplemented by State initials or abbreviations below the basic insigne; the letters should be in a horizontal line, centered below the bottom edge of the circle of the basic insigne. This should be on a separate piece of metal attached in the same manner, as “40 and 8,” pendants are attached to the American Legion button. States desiring to add State designations may do so on all insignia except the basic “CD.” (This will prevent confusion with the State staff insigne.)

**Automobile Stickers and Plates.**—The use of Civilian Defense emblems on automobiles is restricted to cars and trucks employed in the work of Civilian Defense. Emblems may be painted or made of enameled metal. None should be smaller than 4 inches nor greater

than 12 inches in diameter. Uniform size should be maintained in any group or command. Automobile plates can be fixed in any convenient spot on automobiles or trucks. Only the basic "CD" will be used. State designations are not permitted. (This would cause confusion with staff insigne.)

**Flags** should be of standard grade wool bunting. Basic insigne and insignia of rank can be embroidered or sewn on in official colors. The use of the basic emblem of Civilian Defense on flags or banners for display is not restricted when used by itself. The use of group insignia is restricted to appropriate use by groups. State designations shall not be added to the basic insigne in any way that would cause the latter to be confused with the State staff insigne.

**Insignia of Rank.**—The following insignia of rank are authorized for wear on uniforms or for display on flags:

Four gold stars . . . . .	U. S. Director of Civilian Defense.
Three gold stars . . . . .	Regional Director of Civilian Defense, or principal Assistants to U. S. Director.
Two gold stars . . . . .	State U. S. Coordinator of Civilian Defense.
One gold star . . . . .	Local U. S. Coordinator of Civilian Defense.
Three silver pyramids . . . . .	Chief of Service, Local or State (Fire, Police, etc.)
Two silver pyramids . . . . .	Chief of Local Group (Wardens, etc.)
One silver pyramid . . . . .	Captain of Wardens, Assistant to Chief, Zone Leader.
Three black triangles. . . . .	Section Leader.
Two black triangles . . . . .	Squad Leader.
One black triangle . . . . .	Worker, training satisfactorily completed (i. e., Worker, First Class.)

Insignia of rank, gold stars or silver pyramids, should be sewn or pinned on both sleeves starting 4 inches up from bottom of cuff and placed in a vertical line at intervals of 1 inch. Black triangles should be sewn or pinned in a horizontal line at intervals of 1 inch directly below the insignia on arm bands or on uniform sleeve insignia. On uniforms, above are to be worn on both sleeves. Pyramids are to be of a size to fit within a five-eighths-inch circle. Stars are to be five-pointed and must fit within a one-half-inch circle.

Insignia of rank—embroidered.

Stars, gold silk, pyramids, silver silk, triangles, black silk.

Insignia of rank—celluloid.

Stars gold on black background, pyramids, silver on black background, triangles black on white background.

On flags using the basic emblem, stars are authorized only for the use of identification of corresponding rank.

All above insignia are restricted in use to those enrolled trained civilian defense workers entitled to use the respective insignia by their enrollment and successful completion of prescribed training courses, with the exception of banners bearing the basic "CD" insignia which may be purchased and used for display by anybody. \*

\*Also excepted are novelties, of an "unofficial," nonuniform character such as cigarette cases and handkerchiefs. Licenses may be issued to manufacturers of such novelties after submission of samples and approval by the Office of Civilian Defense.



RANK DESIGNATION	▲	▲ ▲	▲ ▲ ▲	△	△ △	△ △ △	★	★ ★	★ ★ ★	★ ★ ★ ★
AIR RAID WARDEN	FIRST CLASS	SENIOR OR SECTOR WARDEN	ZONE LEADER	GROUP LEADER	CHIEF WARDEN	STATE WARDEN	NO OTHER RANKS			
AUXILIARY FIREMEN	"	SQUAD LEADER	PLATOON LEADER	COMPANY LEADER	FIRE CHIEF	STATE FIRE COORDINATOR	NO OTHER RANKS			
AUXILIARY POLICEMEN	"	"	"	"	CHIEF OF POLICE	NO OTHER RANKS				
BOMB SQUADS	"	"	NONE	"	"	NO OTHER RANKS				
RESCUE SQUADS	"	"	DEPOT LEADER	"	FIRE CHIEF	NO OTHER RANKS				
MEDICAL FIELD UNITS	"	TEAM LEADER	SQUAD LEADER	UNIT LEADER	CHIEF OF E. M. S.	STATE MEDICAL DIRECTOR	NO OTHER RANKS			
MEDICAL AUXILIARIES (stretcher teams)	"	" ★	" ★	NO OTHER RANKS						
NURSES' AIDES	NO RANK DESIGNATIONS									
EMERGENCY FOOD AND HOUSING	FIRST CLASS	UNIT LEADER	DEPOT LEADER	GROUP LEADER	CHIEF WARDEN	NO OTHER RANKS				
DRIVERS UNITS	"	CONVOY LEADER	"	"	NO OTHER RANKS					
MESSENGERS	"	SENIOR MESSENGER	PLATOON LEADER	"	NO OTHER RANKS					
ROAD REPAIR CREWS	"	CREW LEADER	DEPOT LEADER	"						
DEMOLITION AND CLEAR.	"	"	"	"	CHIEF OF EMER WORK S	NO OTHER RANKS				
DECONTAMINATION SQUADS	"	SQUAD LEADER	STATION LEADER	"						
FIRE WATCHERS	"	NO OTHER RANKS								
REPAIR CREWS	"	CREW LEADER	SERVICE LEADER	NONE	CHIEF OF UTILITIES	NO OTHER RANKS				
LOCAL STAFF	"	AS REQUIRED			CONTROLLER	COMMANDER	COORDINATOR	NO OTHER RANKS		
STATE STAFF	"	AS REQUIRED			AS DESIGNATED	AS DESIGNATED	ASST COORDINATOR	COORDINATOR	NO OTHER RANKS	
U. S. STAFF	"	AS REQUIRED				AS DESIGNATED	AS DESIGNATED	AS DESIGNATED	REGION DIRECTOR PRINCIPAL ASST'S	U. S. DIRECTOR
EQUIVALENT ARMY TERM	PVT 1st CLASS	NON-COMM OFF	LIEUTENANT	CAPTAIN	MAJOR	COLONEL	BRIG GEN	MAJ GEN	LIEUT GEN	GENERAL






\*ASSIGNED BY RED CROSS TO CHIEF OF EMERGENCY MEDICAL SERVICE.

# Method of Purchasing Official Civilian Defense Insignia

1. All designs of insignia have been patented by the Office of Civilian Defense to prevent their use by unauthorized persons.  
Insignia that are available—cloth arm bands, cloth sleeve insignia for uniforms, embroidered cloth or metal uniform collar and cap emblems, embroidered and celluloid insignia of rank, metal civilian-dress lapel buttons, automobile insignia plates. (See "specifications," p. 29.)
2. Persons entitled to use insignia:  
Only enrolled civilian defense workers who have satisfactorily completed prescribed training courses and paid employees.
3. Who can purchase insignia:  
Responsible officers of State Defense Councils for the local Defense Councils within their respective States.
4. Who must approve orders:  
Regional civilian defense directors. (They may delegate this power to State Defense Councils.)
5. From whom insignia can be purchased:  
Only manufacturers licensed by the Office of Civilian Defense. None will be sold in retail stores.
6. Prices do not depend on quantity purchased:  
Manufacturers are licensed to sell only at the listed prices. This insures equality on all orders both large and small.
7. Sources of funds:  
No Federal funds are available at this time for purchase of insignia. State and local councils must collect the money from their members or other sources if the State and local councils do not provide same.
8. Government "jewelry tax of 10%" on metal insignia:  
This is not finally settled. The manufacturers are discussing the problem with the Internal Revenue Department. If the tax is payable it must be added to the prices quoted in attached list. An opinion has been requested by the OCD.
9. State defense councils will keep records showing totals of all insignia purchased and the manufacturers from whom they were purchased. This report is to be made available on request to the Office of Civilian Defense Insignia Unit, Dupont Circle Building, Washington, D. C.
10. FOR DETAIL PROCEDURE ON ORDERING, CONSULT STATE CIVILIAN DEFENSE COUNCILS.

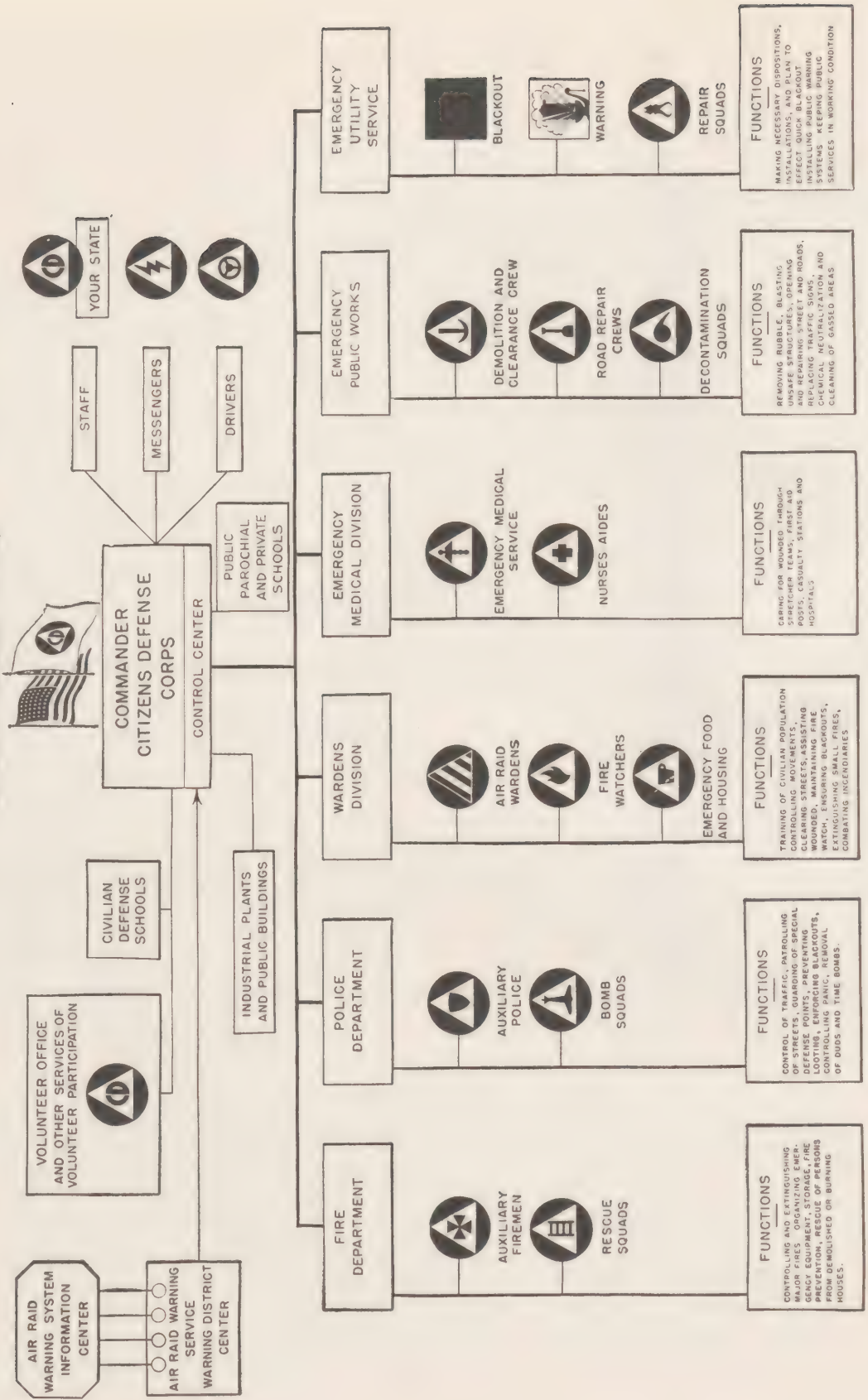


# Equipment Chart

ADMINISTRATIVE GROUP		CORPS OR SERVICE	UNIFORM EQUIPMENT	PROTECTIVE CLOTHING	OPERATING UNIT	SIZE OF OPERATING UNIT	EQUIPMENT OF OPERATING UNIT
COMMAND POST		STAFF (NOT INCLUDING COMMAND)	ARM BAND	1 GASPROOF CAPE, 1 DUTY MASK	CONTROL CENTER, ETC.	VARIABLE	OFFICE, COMMUNICATIONS, MAPS, FILES, ETC.
		MESSENGER SERVICE	ARM BAND	VISIBILITY BELTS, HATS, GASPROOF CAPES AND DUTY GAS MASKS AS REQUIRED.	INDIVIDUAL	SINGLE CORPS	NONE FURNISHED. MESSENGERS FURNISH OWN BICYCLES, AUTOMOBILES.
		DRIVERS CORPS	ARM BAND	NONE	INDIVIDUAL	SINGLE CORPS	CARS AND TRUCKS FURNISHED BY DRIVERS.
FIRE DEPARTMENT		AUXILIARY FIREMAN	ARM BAND	TURN-OUT COATS, PANTS, DUTY GAS MASKS, HIP BOOTS, HELMETS.	GENERALLY, AUXILIARY FIRE STATION	6-10	PORABLE OR TOWER-MOUNTED PUMPER WITH NOSE.
		RESCUE SQUAD	ARM BAND	CIVILIAN GAS PROTECTIVE CLOTHING, DUTY GAS MASKS	RESCUE SQUAD	10	TOOLS AND TRANSPORT FOR DEMOLITION, SHORING, FIRST AID, WRENCHES, ETC.
		AUXILIARY POLICE	ARM BAND	VISIBILITY BELTS, DUTY GAS MASKS, HELMETS, GASPROOF CAPES	PLATOON	30	NONE
POLICE DEPARTMENT		BOMB SQUAD	ARM BAND	NONE	SQUAD	4	EXCAVATING, DERRICK TRUCK, SPECIAL TOOLS
		AID RAID WARDENS	ARM BAND, WHISTLE, WORK GLOVES	DUTY GAS MASKS, VISIBILITY BELTS, HELMETS, 1 GASPROOF CLOTHING, 1 DUTY GAS MASK, 1 GASPROOF CAPE	POST	4-6	DESKS, CHAIRS, TYPERWRITER, FIRST AID KIT, GAS ALARM, RADIO, FLASHLIGHTS, ETC.
WARDENS DIVISION		FIRE WATCHERS	ARM BAND	GASPROOF CAPES, DUTY GAS MASKS	SECTOR GROUPS	5-24	SAND BUCKETS, SCOOPS, SPRAY BUCKET-PUMPS
EMERGENCY MEDICAL DIVISION		MEDICAL PERSONNEL	ARM BAND	GASPROOF CAPES (1 IN 3), DUTY GAS MASKS	FIRST AID POST, STREET CROWD TEAMS, CLEARING STATIONS, HOSPITALS	VARIABLE	FIRST AID KITS OF VARIOUS SIZES.
		NURSES RIDES	SPECIAL UNIFORM PURCHASED FROM RED CROSS	NONE	AS ASSIGNED	VARIABLE	VARIABLE
PUBLIC WORKS EMERGENCY DIVISION		DEMOLITION & CLEARANCE CREWS	ARM BAND	NONE	TRUCK COMPANY	6-24	ONE TO FOUR TRUCKS, PICKS AND SHOVELS FOR 6, DEMOLITION EQUIPMENT.
		ROAD REPAIR	ARM BAND	NONE	TRUCK COMPANY	4-16	1-4 TRUCKS, ROAD TOOLS, RESURFACER, PAINTS, CARPENTER'S TOOLS.
		DECONTAMINATION SQUADS	ARM BAND	CIVILIAN GASPROOF CLOTHING, DUTY MASKS	SPRAY TRUCK UNIT	4-6	WATER TANK, FLUSHER, CHLORIDE OF LIME, BRUSHES, SHOVELS, ETC.

# CIVILIAN PROTECTION ORGANIZATION FOR A MUNICIPALITY

(CITIZEN'S DEFENSE CORPS)





# Schools and Training

The method of training adopted by the OCD on a national scale consists in organizing, in critical points, existing governmental facilities such as at Edgewood Arsenal. To these are invited, at the communities' expense, local technicians in fire fighting and prevention, police, sanitation, health, etc. Intensive courses are given to these "professionals" in the application of their respective services to civilian defense emergency needs, the organization of volunteer auxiliaries to supplement the work of their professional departments, and methods of training the volunteers. Graduates of the national schools for professionals report to their respective organizations for duty as instructors of local volunteer groups. State and local defense councils, in collaboration with local fire, police, sanitation, etc., authorities, provide local "school" facilities, training schedules, etc.

National Training Schools are as follows:

- Edgewood Arsenal, Maryland.
- Civilian Defense Training School, New Orleans, La.
- Civilian Defense Training School, San Francisco, Calif.
- Civilian Defense Training School (Middle West).

# Sample Certificate of Training

## Certificate of Instruction



*This is to certify that*

---

*has satisfactorily completed the Required Courses of Training and demonstrated the necessary knowledge and ability to carry out the duties thereof and is entitled to wear the Official Emblem of the Citizens Defense Corps and the insignia designating him*

### Auxiliary Fireman



*of the* \_\_\_\_\_  
*Civilian Protection Council*

---

*Attest.*



# Periodical Combined-Group Practice

Following is a schedule of *combined-group* practice recommended for the average community:

	<i>Hours</i>	<i>Periods</i>
Staff Corps Air Raid Wardens Fire Watchers Auxiliary Firemen Messengers	3	1 every 2 months.
Staff Corps Auxiliary Police Drivers Corps Emergency Food and Housing	3	1 every 2 months.
Staff Corps Nurses' Aides Medical Corps Rescue Squads Messengers	3	1 every 2 months.
Staff Corps Air Raid Wardens Bomb Squad Rescue Squads Demolition and Clear- ance Crews	3	1 every 2 months.
Staff Corps Demolition and Clear- ance Crews Road Repair Crews Decontamination Squads	4	1 every 4 months.
All groups together		

# Physical Requirements

It is considered unnecessary to prescribe complete specifications for the various protection groups. State and local civilian defense organizations through their own medical divisions should set up minimum physical standards and provide means for physical examinations of volunteers for duties requiring them.

Physical requirements vary widely according to local conditions, organization, and the divers protection tasks. It is said that even some of the blind are active in limited tasks in England during blackouts because of their acute senses of direction, hearing, etc.

Most normal people between the ages of sixteen and sixty are physically capable and can learn the duties of some one of the protection tasks. Care should be taken by those responsible for assigning tasks to avoid assignments to persons emotionally unstable and to the extreme "official" types.



# Volunteer Organizations

It is the policy of the Office of Civilian Defense that organizations may volunteer for service as units in their communities; however, there are certain limitations which are necessary to secure unified command and efficient operation.

Once the units have volunteered, the individual members thereof are subject to the command, control, and administration of the Commander of the Citizens' Defense Corps, his staff, and his chiefs of services while actually on duty. Officers of units will hold command in the Citizens' Defense Corps only when their appointments have been confirmed by the Coordinator of Defense for the city or locality, and will hold office under the same conditions as any other unit leader or commander.

Members of units which volunteer may wear their own organization uniforms if they desire; however, they may not receive or wear federal insignia (arm bands, etc.) except upon the completion of individual training in approved courses, upon the same terms as any other volunteer.

In times other than times of emergency, it is a matter for decision of local authority whether command and administration shall be exercised by the officers of the unit or by the civilian defense authorities of the city.

No organization shall be given exclusive right or franchise for any service, nor shall membership in any other organization be a condition of membership in the U. S. Citizens' Defense Corps.

Individual members of any organization serving with the U. S. Citizens' Defense Corps, may, in the event of emergency, be reassigned, transferred or relieved, according to the decision of the Commander Citizens' Defense Corps; and at any time they are subject to removal for cause, for incompetence, and for inefficiency, upon the same terms as any other volunteer.

It is the policy of the Office of Civilian Defense to welcome volunteer services which are equipped and organized, so long as those services make a contribution to the Civilian Defense effort. It is not a policy of the Office of Civilian Defense to allow any organization to use the civilian defense effort for the upbuilding of its own prestige, membership, or authority.

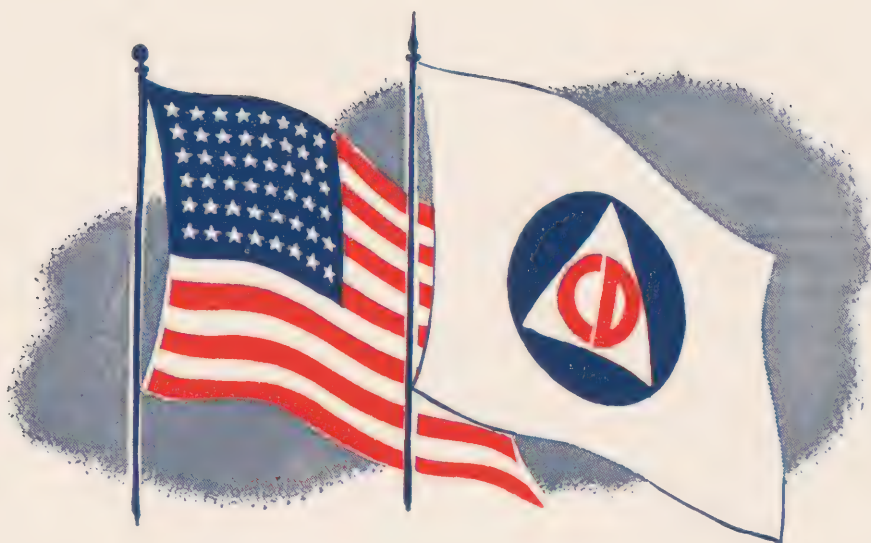
Nothing in the above changes or alters the relationship of the American Red Cross to the Office of Civilian Defense as defined in the statement of policy published September 4, 1941, jointly by the two organizations, and as amplified in the further joint statement of policy developed by the U. S. Office of Civilian Defense, the Office of Defense Health and Welfare, and the American Red Cross, released to the press December 28, 1941.

All insignia are patented by the Office of Civilian Defense. No persons or companies are permitted to fabricate, sell, or use any insignia without license therefor from this office. Names of licensed manufacturers are being supplied to civilian defense workers' groups and councils.

State designations, initials, or abbreviations if desired, may be added to all insignia on arm bands, sleeve insignia, collar and cap ornaments, civilian-dress lapel buttons or flags (except basic "CD") on same basis as on State "Staff" insignia. Such designations are not required except as "Staff" insignia. States adopting such designations will arrange for them direct with the Licensed Insignia manufacturers. Listed prices at which these manufacturers are licensed to sell do not include any State designations except on State and Local Staff ornaments.











# STAFF MANUAL

*United States*

*Citizens' Defense Corps*



OFFICE OF CIVILIAN DEFENSE  
WASHINGTON, D. C.







# STAFF MANUAL

## United States Citizens' Defense Corps

*Prepared by the Training Section*

### OFFICE OF CIVILIAN DEFENSE

#### *Definition*

*Total War* aims at defeat of the enemy by any means available through routing of his armed forces, crippling his sources of supply or destroying the morale of the civilian population.

*Active Defense* opposes trained and armed forces to those of the enemy and seeks to destroy or turn back the attacking force wherever found.

*Passive Defense* provides organization to minimize the effects of enemy action.

*Civilian Protection* is the term adopted to describe "civil defense programs and measures, appropriate to the varying needs of each part of the Nation, designed to afford adequate protection of life and property in the event of emergency" (excerpt from executive order creating the Office of Civilian Defense).

*The Citizens' Defense Corps* is an organization of enrolled civilian volunteers to implement the passive defense. Its principal function will be to minimize the effects of enemy air raids.

*Enemy Objective.* The objects of an enemy air raid upon a city are:

1. To destroy or cripple defense production activities.
2. To disorganize communication and transportation.
3. To break down the morale of the Civilian Population by fire, destruction, and casualties.

*Counter measures.* Even if the enemy succeeds in reaching and bombing his objective, his mission can be frustrated by proper organization to:

1. Control movements of the population during a raid.
2. Direct civilians to maximum shelter available and instruct them in taking cover.
3. Promptly repair broken mains, power, and gas lines; and particularly take such steps as are needed to assure a continuous water supply.
4. Reopen streets and restore communications.
5. Extinguish incendiary fires quickly before they can start conflagrations.
6. Rescue persons trapped in demolished houses.
7. Render prompt first aid and hospitalize casualties quickly.
8. Provide food and shelter for those made homeless.

To provide such organization and carry through such measures is the mission of the Citizens' Defense Corps.

#### *Organization*

(Chart of CDC organization.) Reference is herewith made to other publications of the Office of Civilian Defense which must be studied in connection with the Staff Manual.

1. *How to Organize Civilian Protection in Your Community.*
2. *The United States Citizens' Defense Corps.*
3. *The Control System of the Citizens' Defense Corps.*

#### *The Commander of the Citizens' Defense Corps*

The command of the Citizens' Defense Corps should be lodged in one person, to be

designated by the appropriate local authority empowered to clothe such individual with authority to command.

The Commander will be responsible for the organization, training, and equipment of the Citizens' Defense Corps and will be charged with its proper functioning in emergency. In all periods when his area has received a red warning, and thereafter until official word is received that hostile airplanes are no longer operating in range, he will assume full power to direct such operations as he deems advisable in the passive defense.

The Commander will be assisted by a Staff Group whose compositions and functions are described below.

### **Staff Group**

1. The *Executive Officer* will be responsible for plans and training and will act as second in command.

He will be given assistants as required by the size of the corps including as a minimum five or more Incident Officers and a Chief of Training.

2. The *Controller* is responsible for proper operation of the Control Center and succeeds the Executive Officer in order of Command. His duties include planning the Control System, the selection, training, and testing of personnel for the Control Center Staff. He will maintain a duty roster to insure that the Control Center is always properly attended and supervised. He will see that the Control Center is properly guarded, properly protected against enemy action, and adequately equipped. He will be responsible for dispatching messengers as needed or assigning them on proper request for detached duty.

In the absence of the Commander and Executive Officer, he will be responsible for arrangements to transmit the necessary messages required on receipt of a yellow, blue, or red warning and in the event of a red warning will cause the public warning to be operated.

He will be assisted by a Plotting Officer, Chart Writer, Communications Officer, a Panel Clerk, a Records Clerk, a Radio Aide, and such personnel as are necessary including telephonists, messengers, police guards, radio operators, and office personnel.

3. The *Personnel Officer*, with such assistants as may be needed, will keep personnel records of all enrolled volunteers and will clear all reports of casualties, evacuations, and deaths due to enemy action to the proper municipal department.

4. The *Property Officer* will be responsible and accountable for all clothing, protective devices, machines, tools, and material issued to members or units of the Citizens' Defense Corps. He will receive and receipt for all stores, will arrange for necessary warehousing, distribution, and repairs and will render reports of all material lost or destroyed. He should be bonded in an amount commensurate with the size of the corps.

He will be given such assistants as may be required by the volume of material handled.

5. The *Transport Officer* will make inventory of all available volunteer drivers' units, taxicab companies, bus companies, and other transportation groups and maintain a file of needed information. He will issue all transportation orders and assignments and will have supervision of volunteer drivers' units.

6. The *Billeting Officer* will survey emergency housing facilities, maintain a billeting list and arrange for equipment of emergency barracks. He will utilize the assistance of the Red Cross. He will be assisted by clerical staff as needed and will use the facilities and services of the Feeding and Housing Units by arrangement with the Chief Air Raid Warden.

7. The *Chief of Fire Services* is responsible for the organization and training of Auxiliary Firemen and Rescue Squads in addition to his regularly assigned duties as head of the City Fire Department. He will provide for prompt assembly of his auxiliary units on receipt of yellow warning and for maintaining them in a state of readiness until such time as they are released on order of the Commander.

On report of incidents involving fire or demolition of occupied buildings at the Control Center, he will order the dispatch of apparatus or units of auxiliaries subject to confirmation by the Commander or Executive Officer.

He will provide instructors to train other



services in controlling incendiaries in cooperation with the Executive Officer.

He will provide and maintain a map showing the location of all engine companies and auxiliary units, special fire mains, and storage reservoirs and special fire hazards, special alarm system wiring and location of boxes.

It is not required that the Chief of Fire Services be constantly on duty at the Control Center, but in his absence a Deputy Chief, authorized to act for him, must represent him during a period of alert.

8. The *Chief of Police* is responsible for the organization and training of Auxiliary Policemen and Bomb Squads, in addition to his regularly assigned duties as head of the City Police Department. He will provide for prompt assembly of his auxiliary units on receipt of yellow warning and for maintaining them in a state of readiness until such time as they are released on order of the Commander.

He will arrange such regular duties, beats, patrols, and special guards as may be required by the general need of the situation during both a yellow alert period and at other periods to guard against sabotage. He will clear such dispositions with the Commander or Executive Officer, who will clear them if necessary with Military or State Police Commanders, likewise having jurisdiction in the area.

Upon report of an incident requiring police dispositions, he will dispatch the necessary forces with approval of the Commander or Executive Officer.

He will prepare a map showing police precincts or other police subdivisions of the city, location of police stations, jails and prisons, the special alarm system wiring and report boxes and alarms of the police system and the location of bridges, plants, and reservoirs and buildings requiring special police guards or police surveillance.

It is not required that the Police Chief remain constantly on duty at the Control Center; but in his absence, a Deputy Chief, authorized to act for him, must represent him during a period of alert.

9. The *Chief Air Raid Warden* is responsible for the organization and training of the Air Raid Wardens' Service and the Fire

Watchers, and for the disposition of Emergency Food and Housing Units assigned to him. He will provide for prompt reporting of wardens at assigned posts of duty on receipt of a yellow warning and for the prompt assumption of their duties until such time as they are released on order of the Commander.

He will arrange the division of the City into such groups, zones, and sectors as may be required and for the establishment of Wardens' Posts. It is desirable that groups of Warden Sectors be coterminous with police precincts, or other existing divisions of the municipality. He will insure that the telephones in Wardens' Posts are manned at all times during periods decreed by the Commander. He will provide for proper inspection and control of Wardens' Posts. He will select the Warden Personnel carefully according to procedure outlined in the Manual of Civilian Protection (See Appendix A).

He will cause to be prepared maps of each Warden Sector as described in the Manual for Air Raid Wardens. He will also prepare a map of the area showing the extent of each sector and the location of the Post, the grouping of such sectors into Zones or Divisions, as may be required and such other detail as he may deem desirable. A duplicate of this map will remain in the custody of the Plotting Officer.

He will see to the proper selection, training, and posting of the Fire Watchers and will hold such inspections and alerts as may be mutually decided upon with the Chief of Fire Services.

He will prepare the proper instructions for Warden Service of Schools, Apartment Houses, Hotels, Theaters, Churches, and Stores and will provide for supervision and inspection of these Wardens' Services and those of Industrial Plants and Public Buildings.

He will arrange inspections of Emergency Food and Housing Units to insure their efficiency and availability in need.

He will be charged with responsibility for insuring that official rules for conduct of the public, however disseminated, are carried home to everyone through the Air Raid Warden's Service and such supplementary services (Messengers, Civic and Youth

Organizations) as he may deem necessary.

10. The *Chief of Emergency Medical Services* is responsible for the organization and training of Medical Field Units and Medical Auxiliaries; for the organization of hospitals and Medical and nursing personnel to serve the community needs resulting from enemy action; for the coordination of ambulance services including volunteer auxiliaries; for the assignment of Nurses Aids; for coordinating the first aid training of other services, utilizing the assistance of other organizations such as the local chapters of the American Red Cross.

He will provide for prompt reporting of all auxiliary personnel at assigned posts of duty on receipt of a yellow warning and for the prompt assumption of their duties until such time as they are released on order of the commander.

On report of incidents involving casualties, he will order the dispatch of Medical Field Units subject to confirmation by the Commander or Executive Officer.

He will provide and maintain a map showing the location of Hospitals, Casualty Stations, First Aid Posts, and Decontamination Stations and Medical Supply Depots. A duplicate of this map will remain in the custody of the Plotting Officer.

He will cause to be compiled a daily record of all new casualties and deaths from enemy actions and will clear them through the Personnel Officer to the proper municipal departments.

It is not required that the Chief of Emergency Medical Services be constantly on duty at the Control Center; but in his absence, a Deputy authorized to act for him must represent him.

11. The *Chief of Emergency Public Works Services* is responsible for the organization and training of Demolition and Clearance Crews, Road Repair Crews, and Decontamination Squads. He will provide for prompt reporting of all auxiliary personnel at assigned depots on receipt of a yellow warning.

On report of incidents involving their services, he will dispatch these units subject to confirmation by the Commander or Executive Officer.

He will provide and maintain a map showing the location of depots and material dumps. A duplicate of this map will remain in the custody of the Plotting Officer.

He will assemble daily reports from all crews and transmit them to the Records Clerk.

His personal presence at the Control Center is not required but he must be represented by a deputy, authorized to act in his place during a period of alert.

12. The *Chief of Emergency Utilities* is responsible for the planning and execution of black-outs as ordered by the Commander on Military direction; for the installation, maintenance, and operation of the Public Warning System; and for the organization and training of volunteer auxiliaries to assist existing repair squads for utilities services. He will provide for prompt reporting of all auxiliary personnel at assigned depots on receipt of a yellow warning.

On report of incidents involving repairs to mains, sewers, conduits, cables, wires, or other service facilities, he will dispatch repair units subject to approval of the Commander or Executive Officer.

He will assemble daily reports of the work of these units and transmit them to the Records Clerk.

He will provide and maintain such maps as are needed to show mains, sewers, conduits, cables, and other information of utility services.

He will be assisted by a group of deputies, one to represent each of the Public Utility Services of the Community. In general, these will be telephones, telegraph, water, gas, electricity, and sewage. In the event that the Emergency Utilities Chief must be absent from the Control Room, he will designate a deputy to act for him.

*Liaison Officers* should represent local military or naval establishments, or special police units assigned to duties within the local defense area.

An official designated by the local chapter of the American Red Cross should be appointed by them as liaison officer to the Commander. In natural emergencies, the Red Cross operates independently of the Citizens' Defense Corps for disaster relief. In emer-



agencies arising from enemy action, the Red Cross has agreed to place its units at the disposal and direction of the Commander, Citizens' Defense Corps.

### ***Decentralization in Large Defense Units***

The Staff and single Control Center described in the preceding pages will function adequately in densely populated defense areas, such as cities up to 200,000 population. For larger cities, or Metropolitan Defense Areas, it is necessary to establish in addition to a main Control Center, subsidiary Control Centers. These will be known as Divisional or District Control Centers and are considered and described in "*Control Systems*."

If subsidiary Control Centers are established, all staff elements must be represented under the direction of a Deputy Commander. Each Deputy Commander will function independently under general direction and instruction of the Commander.

Adjoining subsidiary Control Centers will exchange Liaison Officers who will be consulted in the event of incidents near the District or Division Boundaries. The action agreed upon will then be transmitted to the Main Control Center for further disposition, but action will not be withheld.

A full report of each incident will be made by telephone or radio and confirmed in writing, to the Commander at the Main Control Center.

### ***Simplification in Small Defense Units***

In cities under 25,000 population, it is possible to progressively reduce Staff personnel, although each function must still be performed for efficient command. Duties that may be combined in a single individual include:

1. Controller and Communications Officer.
2. Chief of Police and Chief Air Raid Warden.
3. Chief of Emergency Public Works and Chief of Emergency Utilities.

It is also possible to eliminate Incident Officers.

### ***The Incident Officer***

At every incident, there should be one person who takes control of all services and groups converging upon the scene. The first person to assume this duty is usually the Air Raid Warden who reports the incident. He later places himself under a superior, if one appears.

Someone must take charge, and it is unwise to leave the matter to a local debate on seniority. In the excitement and confusion which naturally exists during an aerial attack, it is not unusual for duplicate crews to arrive upon the scene. To promptly remedy such a situation, and to settle disputes if they occur between the heads of units from different services, authority beyond that of a Warden is needed. It is best that someone should directly represent the Commander. Such a person would be the Incident Officer.

A group of Incident Officers, stationed normally at the Control Center, and attached to the Executive Officer, will understudy the Commander. They may be used, in turn, as aides to the Chiefs of Services in order to familiarize them with the character of all Service Operations.

When an incident that has been reported involves the dispatch of units or squads from two or more services, an Incident Officer should be sent to the scene to take charge. He should be accompanied by one or more messengers and escort if deemed desirable. Arriving at the scene, he will select a post where he may be conveniently reached and display the Incident Officers' flag or blue lantern. He should then consider the reports received from unit leaders on the scene and survey the situation by inspection, if necessary.

He will then return all apparatus and personnel not needed and issue orders verbally to proceed with the work. At the first opportunity, an initial report will be written out and dispatched to the Commander by messenger or telephoned and retained.

The Incident Officer will remain at his post until relieved or until all supplementary services have been recalled. He will then return to the Control Center and report fully in writing.

# Appendix A

## *The Warden Service*

Unlike the five other major divisions suggested for the service of protection in a community, the Warden Service has no close counterpart in the ordinary municipal organization. Therefore, it is not possible to organize it by extension of some existing service.

Yet the Warden Service must win and hold the close confidence of the people themselves; it is the key service in relating the protective system to the actual families and men and women and children in the city.

It is the Warden Service which gets people into shelter when a raid warning is sent out; that clears the streets; that teaches and places the fire watchers; that takes charge when a bomb drops creating an "incident." Wardens call for and direct the other services to the points where they are needed; they direct nonmedical bombing victims to the rest centers or other points of assembly, where the Emergency Food and Housing unit takes them in charge. Wardens look out for recovered property, and see that it is cared for until it is claimed by its rightful owners.

In each community served by a control center, there is a Deputy Chief Warden; in each zone, a precinct Warden; and in each sector, a Senior Warden. Each of these has important assistants. These folks in the higher echelons of the Warden Service must be chosen with the greatest care, both for their own

character, calmness, and ability in leadership, and for their standing with the people who will turn to them in times of stress for aid and advice and help and strength.

Therefore, it is advisable in organizing a Warden Service to have the topmost ranks completely appointive; to have the intermediate ranks appointed after investigation, upon the nomination of citizen groups; and to have the lower ranks appointive after volunteering by the people themselves.

Several communities have solved this problem by asking the improvement clubs or other civic organizations in the various districts to hold public mass meetings, at which prospective Sector or Senior Wardens were nominated, subject to investigation and final appointment by the defense council of the city. Some use election districts, community-chest districts, school districts, and the like. Any normal geographical subdivision of the community will serve, since there was usually a logical reason for making such a subdivision in the first place.

Once the Chief or Deputy Air Raid Warden has been chosen, his zone assistants chosen, and the sector or Senior Wardens nominated, investigated, and appointed, the Warden Service is well started. Then volunteers may be called for, to the necessary number, and the organization phase is complete.



## Appendix B

# Publications of the Office of Civilian Defense

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### PLANNING GUIDES (for distribution to staff executives and appropriate committees).

From two to fifteen copies will usually be sufficient for a local defense council and quantities ordered for printing are estimated with a view to such limited distribution. Planning Guides are uniformly 8" x 10½".

1. How to Organize Civilian Protection in Your Community.
2. An Atlas of Civilian Protection. (In preparation.)
3. Emergency Medical Service for Civilian Defense, Medical Bulletin No. 1.
4. Equipment and Operation of Emergency Medical Field Units, Medical Bulletin No. 2.
5. Protection of Industrial Plants and Public Buildings.
6. The Citizens' Defense Corps. Insignia and Paraphernalia.
7. Blackouts.
8. Air Raid Warning System.
9. The Volunteer Office (how to organize it).
10. Control systems.

### MEMORANDA (for use of technical personnel).

To provide engineers and executives with current data on new devices or schemes, memoranda are issued as material is available. Usually not more than five or ten copies are needed for a local Defense Council. The size of memoranda is 8" x 10½".

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### TEXTBOOKS (for technical personnel and instructors).

This series of publications, 6" x 9" in size, is intended for the use of instructors and of enrolled volunteers while training. It is not intended that students retain their copies.

1. Protection Against Gas.
2. Fire Protection.
3. Glass and Glass Substitutes.
4. First Aid in the Prevention and Treatment of Chemical Casualties.
5. Protective Concealment. (Jan. 1942.)
6. Simple Shelters (in preparation by War Department).

### LECTURES (for instructors).

From talks given before classes at the Civilian Defense Schools and stenotyped, the best material has been selected, edited, and reproduced on loose-leaf 6" x 9" sheets in large type suitable for the lecturer. No more than two sets per local training school should be required. Lectures should not be ordered for distribution to the students.

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2. Incendiary Defense Groups.
3. Gas Defense Group.

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This publication outlines the group-training plan in detail and is for the use of the school staff in laying out courses, arranging for qualified instructors and selecting texts. Five to ten copies should serve the needs of the local Defense Council. It is 8" x 10½" in size.

### CONTENTS.

1. Civilian Defense Schools.
2. Requirements for Federal Recognition.
3. Basic Training Courses.
4. Discussion of Basic Courses.
5. Advanced Training for "First Class" Rating.
6. Summary of Training Requirements.
7. How to Get Insignia.
8. Graduations and Awards.
9. Books Useful in Training.

### HANDBOOKS (for individual issue to enrolled volunteers).

This series of publications, 4" x 7½" in size, is designed for the use of the individual enrolled worker. Each volunteer will require a handbook, but it is not necessary to provide other publications for his use. Each local Defense Council should requisition sufficient handbooks for the volunteers in each enrolled group, plus a 20-percent reserve for replacement. Quantities needed should be carefully computed.

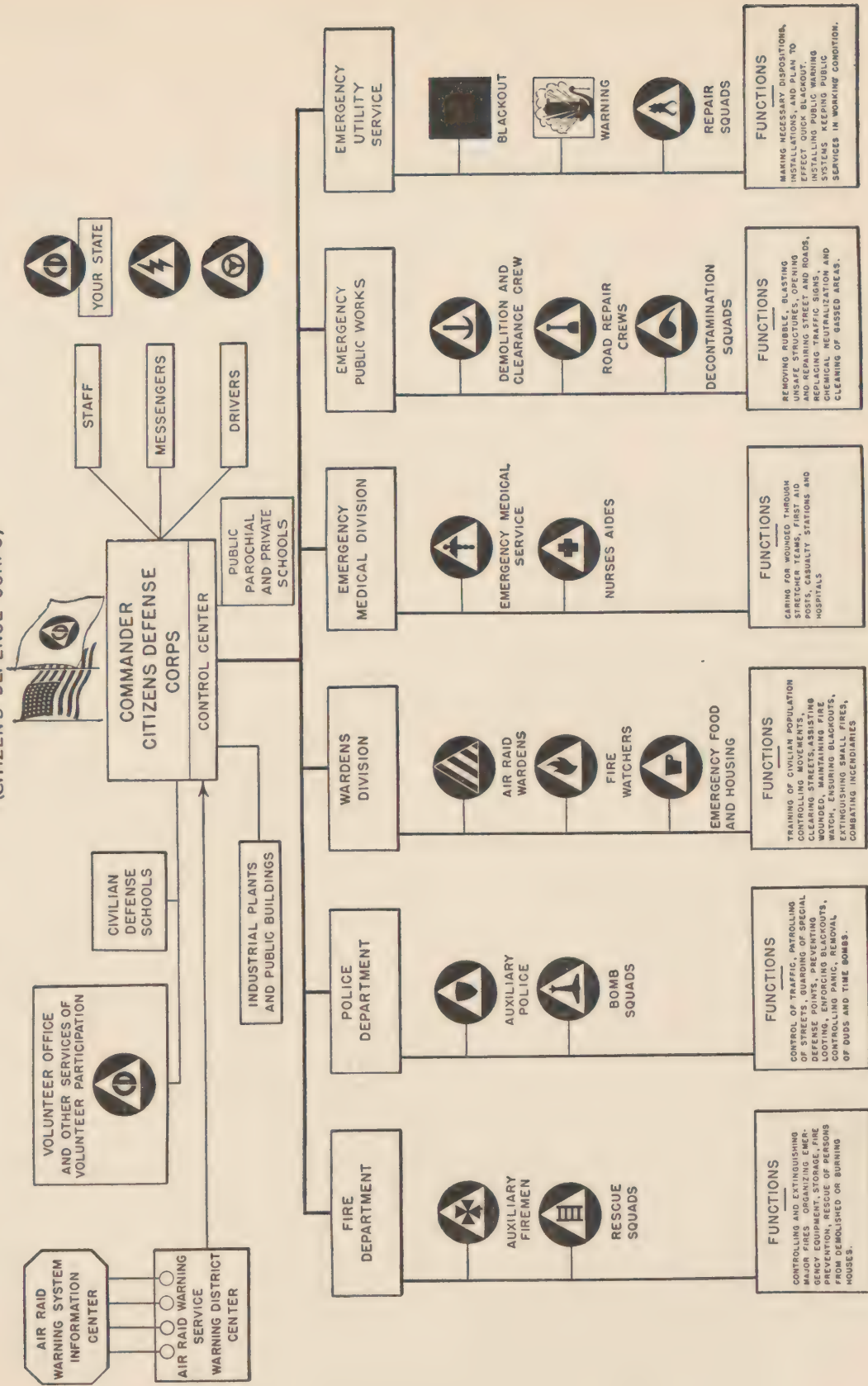
1. Handbook for Air Raid Wardens.
2. Handbook for Auxiliary Firemen.
3. Handbook for Auxiliary Police (in preparation).
4. Handbook of First Aid.
5. Handbook for Rescue Squads.
6. Handbook for Decontamination Squads.
7. Handbook for Emergency Feeding and Housing Corps (in preparation).
8. Handbook for Messengers.
9. Handbook for Drivers (in preparation).
10. Handbook for Bomb Squads (in preparation by War Department).
11. Handbook for Fire Watchers.
12. Staff Manual, U. S. Citizens' Defense Corps.





# CIVILIAN PROTECTION ORGANIZATION FOR A MUNICIPALITY

(CITIZEN'S DEFENSE CORPS)









# *How to Organize* **CIVILIAN PROTECTION** *in Your Community*

OFFICE OF CIVILIAN DEFENSE, WASHINGTON, D. C.

## ***Purpose***

The basic purpose of a local organization for civilian protection is to provide a passive defense against enemy air raids. The organization also provides a means of dealing with active sabotage by enemy agents.

## ***Enemy Objectives***

The objects of an enemy air raid upon a city are:

1. To destroy or cripple defense production activities.
2. To disorganize communication and transportation.
3. To break down the morale of the civilian population by fire, destruction, and casualties.

## ***The Antidote—Passive Defense***

The enemy can be frustrated in large measure by proper organization and training, to—

1. Control the movements of the population during a raid.
2. Direct the public to maximum shelter available and instruct them in taking cover.
3. Promptly repair broken mains, power, and gas lines.
4. Reopen streets and restore communications.
5. Extinguish incendiary fires before they start conflagrations.
6. Rescue persons trapped in demolished houses.
7. Render prompt first aid and hospitalization of wounded.
8. Provide food and shelter for those made homeless.

Organization and specialized training of a large group of volunteers are necessary to accomplish passive defense. This book tells you how to organize it.

## ***Basis of Organization***

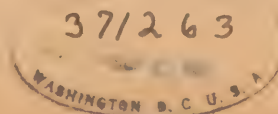
The basis of organization should be, as far as practicable, the existing municipal government, under the guidance of the State Defense Council.

In addition to the Departments of Police, Fire, and Public Works, shown on the chart, it is possible to organize the Emergency Medical Services under the Department of Health in some instances. The Department of Education should be represented on the Defense Council to organize training facilities. The Department of Welfare may be given supervision of Emergency Food and Housing Volunteers, or of private organizations conducting that work.

Whether volunteers should be made part of an existing municipal department or formed into an independent, associated corps will be determined by—

1. Existing municipal facilities.
2. Study of the problem.

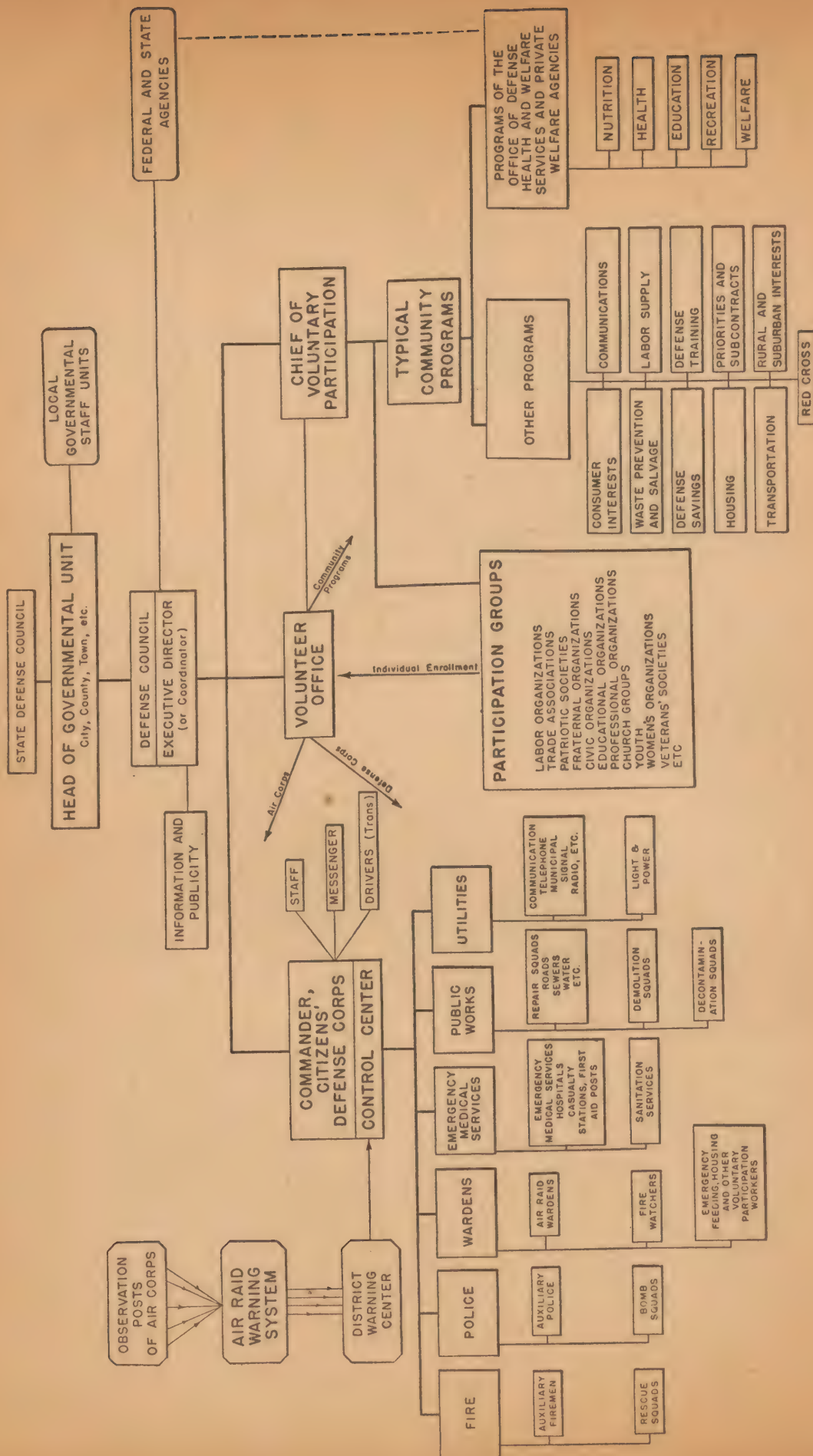
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CIVILIAN PROTECTION

# SUGGESTED LOCAL CIVILIAN DEFENSE ORGANIZATION

OCTOBER 20, 1941





# A TIMETABLE OF CIVILIAN PROTECTION

The following is a check list of steps to be taken in organization. Doubtless your community has already taken many of them. Now is the time to check and see that you have taken all those necessary.

Sound organization is without exception based upon careful study of the job to be done.

It is unwise to enroll volunteers until you have an organization to which to assign them, and a training plan and material for their instruction.

To stage a "blackout" before you have proper equipment and trained personnel to handle matters creates confusion and gives wrong impressions difficult to correct.

"First things first" is a good rule. The following timetable is offered as a guide to organization procedure. The time span for each phase should be determined and set locally.

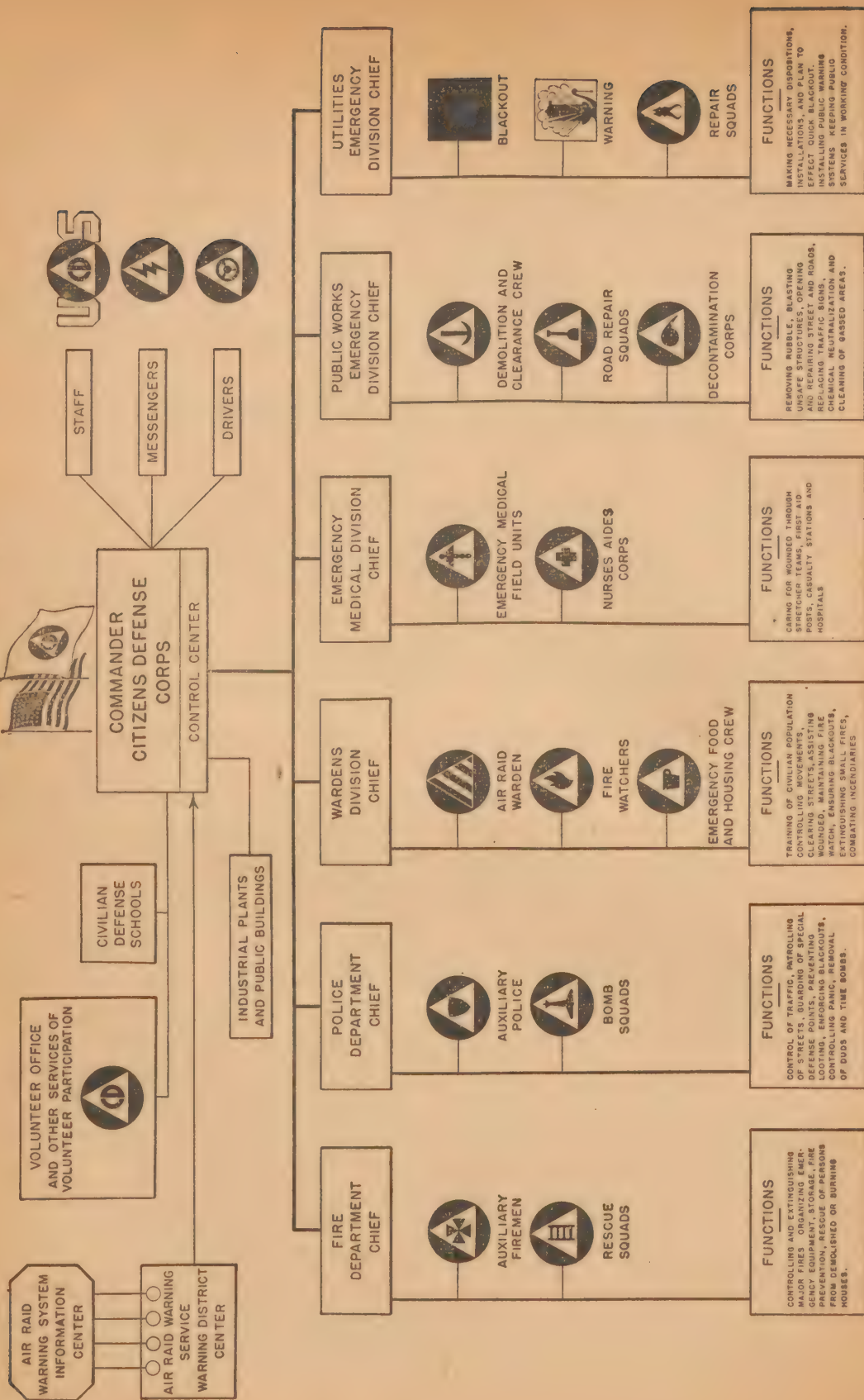
## FOUNDATION PERIOD

### First Phase

1. Proclamation of emergency, if necessary to authorize further steps.
2. Appoint a *Defense Council* to study and develop a defense plan. The Defense Council should be composed of representatives of principal civic groups and associations, and should include representatives of the city departments, local industry, public services, and hospitals.
3. Appoint a defense coordinator, a commander of the citizens' defense corps, a chief air raid warden, a chief of emergency medical services, and committees necessary to carry out the steps enumerated below.
4. *Commander of Citizens' Defense Corps*.—To draw up complete organization plan for civilian protection, including place of existing city departments and functions; organization and assignment of demolition and clearance crews, road repair crews, and decontamination squads with necessary personnel; organization of Feeding and Housing Services with necessary personnel; staff organization and personnel needed for messengers and drivers' corps.
5. *Communications Committee*.—To analyze and map all existing communications systems (telephone, telegraph, police, fire, radio, etc.) to determine location of control center; to list auxiliary equipment needed; to confer with Air Raid Warning System officials on warning methods. To submit report.
6. *Fire Defense Committee*.—To work under fire chief. To develop emergency fire plan, determine location of auxiliary stations, water storage and equipment required, number of men to be enrolled for auxiliary firemen. To designate candidates for Civilian Defense School. To confer with local industries. To estimate personnel and equipment needed for rescue squads.
7. *Committee on Blackout and Camouflage*, including industrial representation to survey facilities and equipment and formulate a plan of operation.
8. *Committee on Transportation*.—To survey facilities and suggest emergency organization.
9. *Committee on Evacuation*.—To determine racial, religious, and age components of population and confer with State authorities regarding emergency evacuation.

# CIVILIAN PROTECTION ORGANIZATION FOR A MUNICIPALITY

(CIVILIAN DEFENSE CORPS)





10. *Utilities Committee*.—To survey facilities and submit recommendations for emergency repair organizations; installation of Public Warning System; installation of stand-by power plants, emergency lines, and other needed new facilities.
11. *Volunteer Office Committee*.—To set up volunteer office and survey all local organizations, also to determine defense activities aside from those of the Citizens' Defense Corps.
12. *Budget Committee*.—To determine special defense expenditures needs and provide appropriate legislation or other action to secure funds or equipment.
13. *Public Relations Committee*.—To draw up plans for publicity campaign.
14. *Chief of Police* (or corresponding authority).—To determine auxiliaries needed, outline duties and designate candidates for training at Civilian Defense Schools.
15. *Chief Air Raid Warden*, with necessary staff to determine sectors and locations of warden's posts. To determine zones, precincts, and sectors, as well as the number of wardens and equipment needed.
16. *Committee on Training*.—To determine location of schools for training, designate instructors, and arrange for special training. To include representation from Board of Education, Fire, and Police Departments.

*Medical Advisory Council*.—Representing health department, medical society, hospitals, nursing, Red Cross, etc., to assist and advise the Chief of Emergency Medical Services.

*Chief of Emergency Medical Services*.—To survey medical facilities, including personnel, to coordinate these facilities in organizing a Field Casualty Service and to assist the Red Cross in first aid and Volunteer Nurses' Aide training as described in Medical Division Bulletin No. 1 and No. 2.

All of the above committees and services can work at the same time. Their work can be greatly accelerated but the data and plans they develop are essential to sound organization.

## ORGANIZATION PERIOD















### Second Phase

1. Adopt and proclaim the defense organization. (Citizens' Defense Corps of . . . . .)
2. Organize local training schools and send selected instructors for special courses at Civilian Defense Schools and other selected defense schools.
3. Compile matériel requirements (fire apparatus, alarm equipment, auxiliary power plants, shelter construction) and submit budget for purchase or requisition.
4. Place orders for needed matériel.
5. Revise and improve city (or defense area) map.
6. Enroll volunteers for service.
7. Study evacuation plans in connection with State and regional committees.
8. Start installations if necessary materials are available (telephone, etc.).
9. Organize publicity and start releases.

# CIVILIAN PROTECTION ORGANIZATION FOR A MUNICIPALITY

## ENROLLED WORKERS GROUPS, ASSIGNMENTS, DUTIES, AND TRAININGS

REQUIRED HOURS IN  
TRAINING COURSES

ADMINISTRATIVE GROUP		Corps or Service	No. 1000 PWA	Duties	1st Aid	Fire	Gas	Gen. Eng.	Dem.	Uniform Equipment	Protective Clothing	Operating Unit	Size of Operating Unit	Equipment of Operating Unit
COMMAND POST		STAFF (NOT INCLUDING COMMAND)	6	TYPING, RECORDS, SWITCHBOARD GENERAL OFFICE DUTIES	10	3	2	5	2	ARM BAND	1 GASPROOF CAPE (M 6) 1 DUTY MASK	CONTROL CENTER, ETC.	VARIABLE	OFFICE, COMMUNICATIONS, MAPS, FILES, ETC.
		MESSENGER SERVICE	8	DELIVERING MESSAGES AS REQUIRED, UNDER ALL CONDITIONS. OTHER GENERAL TASKS.	10	3	2	5	2	ARM BAND	VISIBILITY BELTS AND GASPROOF CAPES AND DUTY GAS MASKS AS REQUIRED.	INDIVIDUAL	SINGLE CORPS	NONE FURNISHED. MESSENGERS FURNISH OWN BICYCLES, AUTOMOBILES.
		DRIVERS CORPS	5	DRIVING FOR STAFF, MEDICAL CORPS OR WHEREVER ASSIGNED. USUALLY FURNISH OWN CAR.	10	0	5	5	2	ARM BAND	NONE	INDIVIDUAL	SINGLE CORPS	CARS AND TRUCKS FURNISHED BY DRIVERS.
		AUXILIARY FIREMAN	4	ASSISTING REGULAR FORCE, LARMO ROSE RELAYS, OPERATING SMALL PUMPS.	10	10	2	5	5	ARM BAND	TURN-OUT COATS, PANTS, DUTY GAS MASKS, HIP BOOTS, HELMETS.	GENERALLY, AUXILIARY FIRE STATION	6-10	PORTABLE OR TRUCK-MOUNTED PUMPER WITH HOSE.
FIRE DEPARTMENT		RESCUE SQUAD	2	RESCUE OF PERSONS TRAPPED IN DEBRIS, EMERGENCY FIRST AID.	20	10	5	5	2	ARM BAND	CIVILIAN GAS PROTECTIVE CLOTHING, DUTY GAS MASKS.	RESCUE SQUAD	10	TOOLS AND TRANSPORT FOR DEMOLITION, SHORING, FIRST AID, WRENCHES, ETC.
		AUXILIARY POLICE	4	ASSIST POLICE, ENFORCE BLACKOUT SPECIAL GUARDS, TRAFFIC CONTROL	10	3	5	5	5	ARM BAND	VISIBILITY BELTS, DUTY GAS MASKS, HELMETS, GASPROOF CAPES.	PLATOON	30	NONE
		BOMB SQUAD	UN.	REMOVE UNEXPLODED BOMBS DISPOSE OF THEM.	10	0	2	5	2	ARM BAND	NONE	SQUAD	4	EXCAVATING, DERRICK TRUCK, SPECIAL TOOLS
		AID, AID WARDENS	8-12	CLEARING STREETS, ASSISTING PEOPLE, CHECKING BLACKOUT, FIRST AID, FIRE-FIGHTING, REPORTING FALLEN BOMBS, SOUNDING GAS ALARMS, ETC.	10	3	5	5	2	ARM BAND, WHISTLE WORK GLOVES	DUTY GAS MASKS, VISIBILITY BELTS, HELMETS, 1 GASPROOF CLOTHING, 1 POST 1 GASPROOF CAPE	POST	4-6	DESKS CHAIRS, TYPEWRITER, FIRST AID KIT, GAS ALARM, RADIO, FLASHLIGHTS, ETC.
WARDENS DIVISION		FIRE WATCHERS	10-20	TAKE POST AT OBSERVATION POINTS. SPOT AND DISPOSE OF INCENDIARIES.	0	3	2	5	2	ARM BAND	GASPROOF CAPES, DUTY GAS MASKS.	SECTOR GROUPS	5-24	SAND BUCKETS, SCOOPS, SPRAY BUCKET-PUMPS.
		MEDICAL PERSONNEL	3	RENDER FIRST AID, EVACUATE WOUNDED, DECONTAMINATE PERSONS	20	0	2	5	2	ARM BAND	GASPROOF CAPES (M 6) 3 DUTY GAS MASKS	FIRST AID POST, STREET-CLEANING TEAMS, CLEARING STATIONS, HOSPITALS	VARIABLE	FIRST AID KITS OF VARIOUS SIZES.
		NURSES AIDES	6	ASSIST IN HOSPITALS, HOMES, SCHOOLS, INDUSTRIES.	SPEC	0	2	5	2	SPECIAL UNIFORM PURCHASED FROM RED CROSS	NONE	AS ASSIGNED	VARIABLE	VARIABLE
		DEMOLITION & CLEARANCE CREWS	2-6	DYNAMITE UNSAFE STRUCTURES, REMOVE RUBBLE, FILL CRATERS, CLEAR UP	0	3	2	5	2	ARM BAND	NONE	TRUCK COMPANY	6-24	ONE TO FOUR TRUCKS, PICKUPS AND SHOVELS FOR DEMOLITION EQUIPMENT.
PUBLIC WORKS EMERGENCY DIVISION		ROAD REPAIR	2-4	FILL HOLES, LEVEL ROAD SURFACE, APPLY TOP DRESSING, RESTORE SIGNS	0	3	2	5	2	ARM BAND	NONE	TRUCK COMPANY	4-16	1-4 TRUCKS, ROAD TOOLS, RESURFACER, PAINTS, CARPENTER'S TOOLS.
		DECONTAMINATION SQUADS	1-2	CHEMICALLY NEUTRALIZE AND WASH OFF PERSISTENT GAS WALLS AND STREETS, DECONTAMINATE CLOTHING AND EQUIPMENT.	10	0	5	5	2	ARM BAND	CIVILIAN GASPROOF CLOTHING, DUTY MASKS	SPRAY TRUCK UNIT	4-6	WATER TANK, FLUSHER, CHLORIDE OF LIME, BRUSHES, SHOVELS, ETC.



# TRAINING PERIOD

## Third Phase

1. School training of enrolled volunteers.
2. Assignment of graduates to units and group training. Issue equipment, and train in its use.
3. Complete communications unit and control center.
4. Complete installation of air raid warning signals.
5. Complete installations, as far as planned, of emergency fire installations (water storage, auxiliary fire stations, fire buckets and pumps, etc.).
6. Complete organization of air raid warden's posts.
7. Complete medical organization and select sites for casualty stations.
8. Equip and organize rescue squads, drivers' corps, and messenger service.
9. *Test* Staff functioning by field drills.
10. Complete evacuation plans.
11. Complete installation of extra equipment, line, etc., as planned, of utilities.
12. Adopt procedure for blackout.
13. Install necessary equipment for blackouts in public buildings and industrial plants.
14. Continue publicity and alert public to coming test.
15. Check up individually on all services and functions.
16. Initiate training of public in individual home precautions.

# TEST PERIOD

## Fourth Phase

1. Test operations of air raid warning system.
2. Test operation of each service or corps separately.
3. Retest staff functions by drills.
4. Test daylight coordination of all elements and correct deficiencies.
5. Test blackout.
6. Coordinate tests of all elements in blackout and correct deficiencies.
7. Weed out inefficient personnel.
8. Retest all elements in conjunction with simulated air raid exercises by air corps.

# ALERT PERIOD

## Fifth Phase

NOTE.—If imminent danger of air raid, decrease intervals in tests and inspections.

1. Hold monthly inspections of equipment, clothing.
2. Continuing inspection of warden's posts, auxiliary fire stations, casualty station sites, etc.
3. Repeat general alarm test in cooperation with Army command.
4. Continue education of public and morale building.
5. Strive to complete equipment, improve organization, and create perfect teamwork.

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8. Air Raid Warning System.
9. The Volunteer Office (how to organize it).
10. Control Systems.
11. Protection of Hospitals.
12. Protection of School Children and School Property.
13. Volunteers in Health, Medical Care, and Nursing.
14. Volunteers in Recreation (in preparation).
15. Volunteers in Family Security (in preparation).
16. Manual of Physical Fitness (in preparation).

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Books Useful in Training.
2. A Training Guide for Volunteer Nurses' Aides.
3. Training Auxiliary Firemen.
4. First Aid Course for Civilian Defense.
5. Advanced First Aid for Civilian Defense.
6. A Training Guide for Bomb Squads (in preparation).
7. Staff Manual.

## HANDBOOKS (for individual issue to enrolled volunteers).

This series of publications, 4" x 7½" in size, is designed for the use of the individual enrolled worker. Each volunteer will require a handbook, but it is not necessary to provide other publications for his use. Each local Defense Council should requisition sufficient handbooks for the volunteers in each enrolled group, plus a 20-percent reserve for replacement. Quantities needed should be carefully computed.

1. Handbook for Air Raid Wardens.
2. Handbook for Auxiliary Firemen.
3. Handbook for Auxiliary Police.
4. Handbook of First Aid.
5. Handbook for Rescue Squad Leaders.
6. Handbook for Decontamination Squads.
7. Handbook for Emergency Feeding and Housing Corps (in preparation).
8. Handbook for Messengers.
9. Handbook for Drivers.
10. Handbook for Bomb Squads (in preparation).
11. Handbook for Fire Watchers.
12. Citizens' Defense Corps Staff Manual.
13. Handbook for Road Repair Crews.
14. Handbook for Demolition and Clearance Crews.



# **AIR RAID WARNING SYSTEM**



**OFFICE OF CIVILIAN DEFENSE  
WASHINGTON, D. C.**

*Prepared by the*  
**WAR DEPARTMENT**  
*with the Assistance and*  
*Advice of Other Federal*  
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# CIVILIAN AIR RAID WARNING SYSTEM

**Prepared under the supervision of the Chief  
Signal Officer, U. S. Army, with suggestions  
of the National Technological Civil Protection  
Committee.**

## FOREWORD

The effectiveness of the entire scheme of civilian defense depends largely upon the effective organization and functioning of the civilian air raid warning system.

An understanding of how, when, and where the military aircraft warning service is coordinated with the civilian air raid warning system and of how the latter functions with the whole scheme of civilian defense is essential to the successful organization and operation of any of these defense agencies.

In this connection attention is particularly directed to the civilian defense pamphlets "Blackouts" and "Fire Protection."

The data and information contained herein are based upon the latest and most authoritative information available upon the date of publication, and are intended as helpful suggestions, many of which may be modified and adapted to each local situation and to specific installations. However, care must be taken to be certain that no modification of essential procedure is introduced.

In no sense should issuance of this pamphlet be construed as a signal to start work immediately upon installations. Using the material in this pamphlet as a guide, studies of existing installations and plans for extending or adapting them can be initiated by responsible agencies. The Office of Civilian Defense will announce when the actual installations should be made.

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# Chapter I.—GENERAL

**1. PURPOSE.**—This pamphlet is furnished primarily as a guide to aid local civilian defense organizations in the proper and efficient discharge of their duties with the air raid warning service in the event of air raids, and its purpose is twofold:

a. To furnish a set of instructions to local civilian defense organizations for the installation and operation of a civilian air raid warning system.

b. To explain how the civilian air raid warning system will be coordinated with the military aircraft warning service.

## 2. DEFINITIONS.

a. **Air Raid.** An attack or threatened attack upon terrestrial objectives by enemy aircraft.

b. **Civilian Air Raid Warning System.** A system organized to give warning by messages and signals of the approach of enemy aircraft in order that steps may be taken in ample time to preserve life and adopt such measures of passive defense as may be deemed necessary.

c. **Blackout.** Noun—A condition under which all or certain lights are extinguished or effectively screened. Verb—To extinguish or screen lights for this purpose.

d. **Air Defense Region.** The basic territorial division for air defense. Each such region is served by an information center.

e. **Warning District.** A subdivision of the air defense region. It is the basic territorial division for the application of air raid warning messages.

f. **Warning Sub-district.** A city, community, or subdivision within a warning district.

g. **District Warning Center.** The agency which receives and acknowledges air raid warning messages originating in information or filter centers.

This agency then distributes the air raid warning messages to the warning sub-districts.

h. **District Toll Office.** The principal telephone exchange in a warning district.

i. **Sub-district Toll Office.** A minor telephone exchange in an air raid warning district which aids in distributing messages to recipients.

j. **Information Center.** The military installation in each air defense region to which all reports of approaching enemy aircraft are submitted and which takes necessary action and notifies the proper agencies.

k. **Filter Center.** Filter centers receive and evaluate reports of hostile and friendly aircraft and immediately transmit the evaluated information to information centers. In some cases filter centers are control centers for active defense troops and distributing centers for warnings to district warning centers in their filter areas.

## 3. RESPONSIBILITIES.

a. It is the function of the military aircraft warning service to gather information of approaching enemy aircraft, to transmit this information to a central point (information center), to evaluate this information and to decide which district should be warned.

b. It is the responsibility of the air raid precaution officer in the operations room at the information center to transmit the warning to the proper district warning center.

c. It is the responsibility of the local air raid warning officials, upon receipt of air raid messages to sound local warnings on sirens or other sound signaling devices, and pass the warning to individual recipients.

# The Civilian Air Raid Warning System

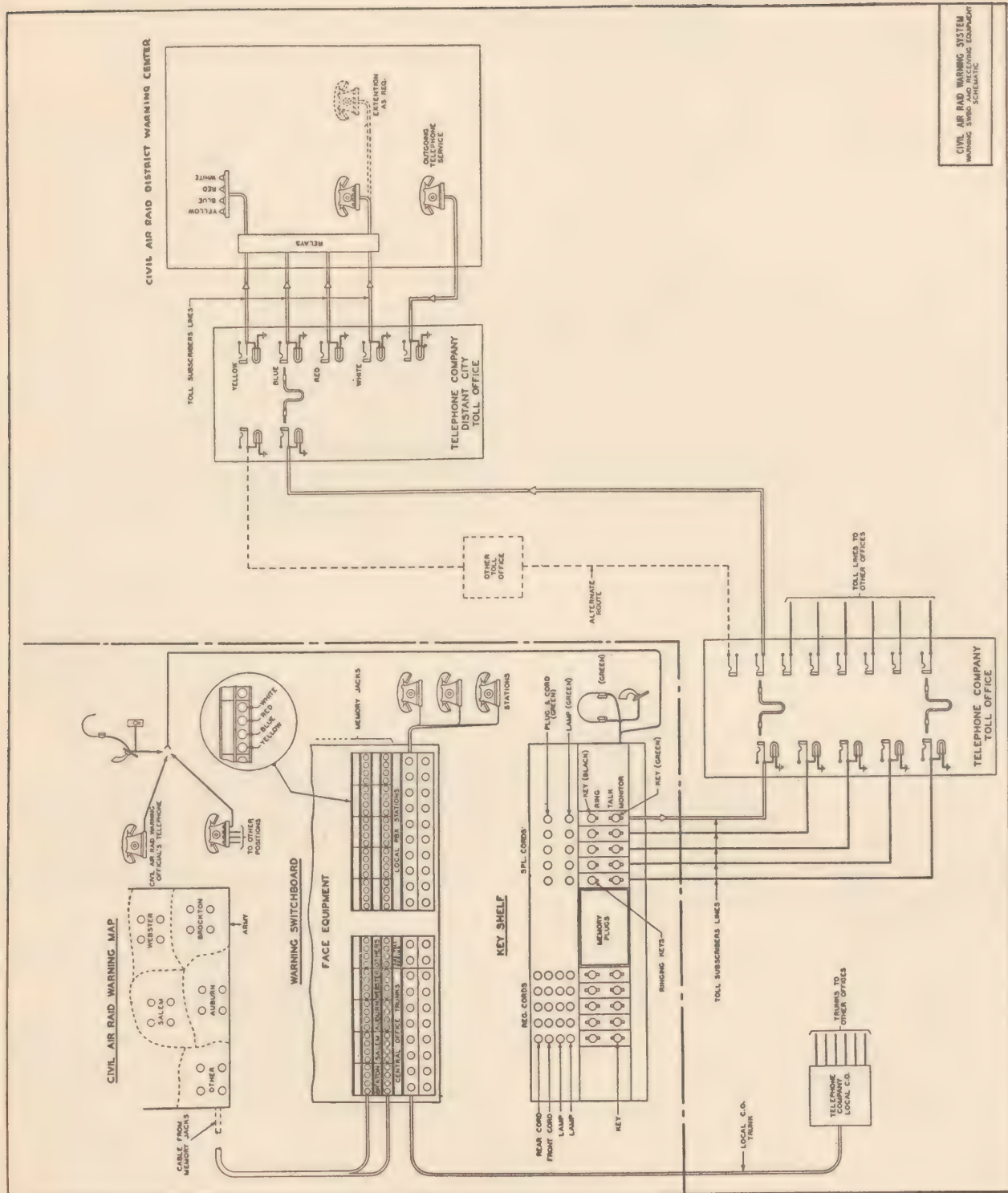


Figure 1



## Chapter II.—

# THE MILITARY AIRCRAFT WARNING SERVICE

**4. ORGANIZATION.**—In general the aircraft warning service is organized as follows:

a. Observation stations are established to observe and report the approach of all enemy aircraft.

b. An information center is established to which reports from observation stations are transmitted directly or through filter centers where these reports are charted and necessary action taken. (See par. 7.)

c. A communication system is provided consisting of telephone, telegraph printer, radio, or any other means of signal communication connecting these various agencies together so as to afford rapid and accurate intercommunication.

**5. FUNCTIONS.**—One of the functions of the aircraft warning service is the timely transmittal of warnings of approaching enemy aircraft to affected localities. The information center will selectively transmit warnings to the warning districts at such time prior to the arrival of the hostile aircraft as will permit adequate dissemination of warning and proper measures for meeting the threatened attack. The information center also informs all previously warned agencies when the threat of air attack has passed.

**6. EQUIPMENT IN THE ARMY INFORMATION CENTER.**—The telephone equipment provided in each Army information center for use in transmitting air raid warning messages will normally consist of the following:

a. A hand telephone set or operator's telephone set for the air raid precaution officer. If more than one warning switchboard position is provided, keys are furnished to connect this telephone set to the different positions.

b. An air raid warning map within view of the air raid warning official. This map covers the area of all districts under the information center and is equipped with four lamps colored yellow, blue, red, and white for each warning district. It will be specially prepared for each information center and its size will depend on the number of districts served.

c. An air raid warning switchboard of sufficient capacity to handle all air raid warning calls without delay. This switchboard will be connected to the appropriate telephone operating centers (see Fig. 1). The installation and the operation of the "Air Raid Warning Switchboard" is a responsibility of the Army.

d. Extension lines from this warning switchboard to nearby telephones. One of these could be located near the air raid precaution officer for emergency use.

e. A line from the telephone circuit of each warning switchboard position directly to the telephone set of the air raid precaution officer.

f. Wiring between the jacks in the warning switchboard and the lamps in the warning map.

## 7. PROCEDURE AT THE INFORMATION CENTER AND INFORMATION CENTER EXCHANGES.

a. Air raid warning messages originate in the operations room of the information center or filter center, where all information in regard to the movement of hostile airplanes over the region is received and evaluated.

b. The air raid precaution officer transmits the warning to the proper district warning centers.

Insofar as possible, the warnings will be transmitted to the district warning centers in sufficient time to allow its dissemination to the lowest using agency prior to the arrival of hostile aircraft over the warning district.

(1) To illustrate the method of transmitting a message, assume that a Red air raid warning message originates in the Alpha Information Center to warn the Beta District of the imminent approach of hostile airplanes.

(a) The telephone orderly in the Alpha Information Center lifts his handset, and when the switchboard operator answers, announces, "Beta—red." (An air raid message is passed by first announcing the name of the district to be warned, followed by the color of the type of air raid warning message.)

## The Civilian Air Raid Warning System

(b) While the connection is being completed, the telephone orderly fills in the necessary information on a form colored to correspond to the type of warning issued (see Figure 2).

AIR RAID WARNING—RED	
<i>Exchange to be advised</i>	.....
<i>Time message dispatched</i>	.....
<i>Initials of dispatcher</i>	.....

Figure 2

This form when completed is filed with the information center records.

(c) Upon receipt of the message, the operator at the information center air raid warning switchboard connects an idle cord to the jack in the face of the switchboard which is designated as "Beta—red." This, together with the operation of the "talk" key, lights the line lamp in the Alpha Toll Central Office and also lights a red lamp on that part of the warning map representing the Beta District. This map is within view of the air raid precaution officer. When the Alpha toll operator answers, the warning switchboard operator announces "Air raid warning—Beta—red." Then the Alpha operator establishes a regular toll connection to Beta over any one of the available inter-toll trunks. The Beta inward operator then completes the connection to a jack in the face of her switchboard which is clearly designated "Beta—red." The circuit associated with this jack is multipled before all inward operators and it terminates in the message receiving equipment in the district warning center in Beta.

(d) When the Beta inward operator rings on this line to the Beta District Warning Center, a bell is rung and a lamp is lighted in the center. The lamp is colored the same as the color with which the toll office jack is designated, which is, in this case, red. The air raid warning officer in the district warning center answers the call by stating "Beta—red." When the switchboard operator on the information center air raid warning switchboard hears this answer he replies "Right, Warning Operator No. ———," unless the answer is erroneous, in which case he corrects the message. Then the switchboard operator at the information

center disconnects the cord from the memory jack and restores the associated talk key. However, he inserts a memory plug in the jack from which the cord was disconnected for the purpose of keeping lighted the lamp in front of the air raid precaution officer, and also for the purpose of providing a record of the transmitted warnings, which is visible to himself.

**8. COORDINATION WITH THE CIVILIAN AIR RAID WARNING SYSTEM.**—In order that the civilian air raid warning system may function properly and efficiently, close cooperation and coordination must be maintained between the military aircraft warning service and the civilian air raid warning organizations.

When the appropriate military commander decides that an air defense area is vulnerable to bombardment, he will alert that area, even though there appears to be no immediate threat of enemy action. A district is alerted when it is considered that the enemy is capable of delivering an effective attack upon it.

(Note.—Since the "Alert" requires preliminary measures of readiness on the part of all air raid precautions agencies, such as first-aid stations and fire and police departments, it is applicable to the situation by day as well as by night, and may be intermittent or continuous over long periods.)

Prior to the time of being alerted there need be no lighting restrictions imposed upon an area. However, that area should have made preparations to put into effect the lighting restrictions required by the various warnings.

An area which has been alerted will be blacked out at night except for the following:

- (1) Essential industry and transportation will be allowed sufficient lights for efficient operation.
- (2) Street lights will be kept on but will be properly screened and of such low power that they cannot be seen from the air.

When the appropriate military commander finds that the area is not likely to be subject to aerial bombardment he will so inform the civilian air defense authorities in the area.

**9. AIR RAID WARNING MESSAGES.**—The types of air raid warning messages are as follows:

a. **Air Raid Message—Yellow—Preliminary Caution.**—This warning is a message issued by telephone to essential industry and transportation which have been allowed special lights. It serves to notify them that they must get ready to obscure their special lights upon a Blue or Red warning. This warning



### AIR RAID WARNING SIGNALS





COLOR	NAME OF MESSAGE	TEXT OF MESSAGE PASSED BY TELEPHONE	DISTRIBUTION AND MEANING	SIGNAL
	PRELIMINARY CAUTION	"AIR RAID MESSAGE-YELLOW"	CONFIDENTIAL- TO LIMITED NUMBER OF RECIPIENTS WHO TAKE PRECAUTIONARY AND UNOBTRUSIVE MEASURES TO BE READY TO ACT INSTANTLY THE ACTION WARNING IS RECEIVED.	TELEPHONE CALL ONLY
	2 <sup>ND</sup> STAGE OF CAUTION	"AIR RAID MESSAGE-BLUE"	CONFIDENTIAL- TO LIMITED NUMBER OF RECIPIENTS SAME AS ABOVE AND AS A "LIGHTS WARNING."	TELEPHONE CALL ONLY
	ACTION WARNING	"AIR RAID WARNING-RED"	PUBLIC WARNING- MEANING THAT AN AIR RAID MAY OCCUR WITHIN A SHORT TIME.	TELEPHONE CALL PLUS PUBLIC AIR RAID WARNING INSTRUMENT.
	ALL CLEAR	AIR RAID MESSAGE-WHITE"	CIRCUMSTANCES NECESSITATING THE PRELIMINARY CAUTION NOW PASSED. ALSO, IF OTHER WARNINGS HAVE BEEN SENT THIS INDICATES "ALL CLEAR"	TELEPHONE CALL. PUBLIC WARNING ALSO IF "RED" IS STILL IN FORCE.

Figure 3

may also be issued to places where action in connection with air raid precautions require a long time to put into effect.

**b. Air Raid Message—Blue—Lights Warning.**—This warning is a message issued by telephone to essential industry and transportation. It means that raiders are expected to pass over that area. It serves to notify essential industry and transportation that they must obscure their special lights at once. If, as may happen, a Red warning is given without a prior Blue warning the special lights must be obscured at once.

**c. Air Raid Message—Red—Action Warning.**—This warning, upon which a public warning shall be given, is issued by all planned means of communication. It means that an air raid may occur in five minutes and that immediate action in regard to air raid precautions is to be taken.

**d. Air Raid Message—White—Raiders Passed.**—This warning, upon which a public signal is given, if action warning Red is in force, means that the hostile planes have left the area or the threat of a raid is no longer imminent. It serves to notify essential industry and transportation that they may resume the use of the special lights allowed them under provisions for the "Alert." If, as may occur, the recipient has received no previous warning, no action is required.

The Yellow and Blue warnings are confidential and are limited to the use of the district warning center.

Figure 3 shows the foregoing information in graphic form.

**10. CHART.**—The normal distribution of air raid warning messages from the information center to the recipients is indicated in Figure 4.

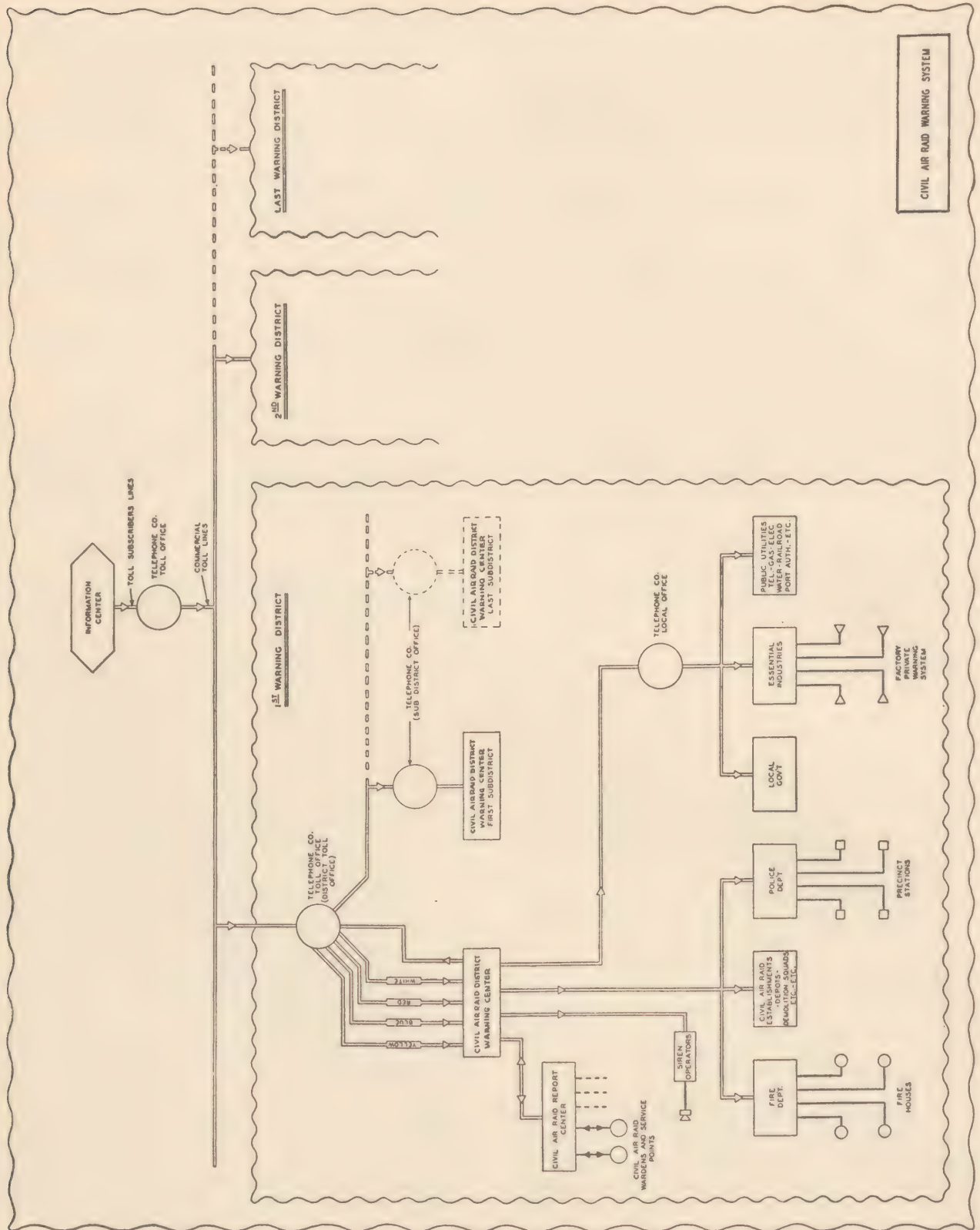


Figure 4



## Chapter III.—

# THE CIVILIAN AIR RAID WARNING SYSTEM

### 11. ORGANIZATION.

a. This section details the standard procedure to be adopted in connection with the distribution of air raid warning messages from the information center to their final distribution to authorized recipients.

b. The United States has been divided into air defense areas and each such area is, or will be, subdivided into warning districts. The warning district is the unit of the civilian air raid warning system, and a message transmitted to any warning district will always apply to the whole of that district and to that district only. It is important that a message for one warning district should not become known to persons in another district. Messages will be dispatched from the point of origin to the warning districts, one at a time, as each district becomes threatened by the progress of a raid.

c. (1) (a) The telephone will be the principal means of communication, supplemented by commercial telegraph service, telegraph printer service, and messengers. While telephone cables may be damaged by bombs, it is not thought that widespread breakdown of the telephone service need be feared; emergency repairs can be effected quickly. The local telephone manager should be informed of the telephone numbers of the lines which are essential to the air raid warning system so that if they are broken, priority may be given to their repair.

(b) In many areas extensive police systems are in operation, the lines terminating on a switchboard at a police station and providing telephonic communication with boxes in various parts of the area concerned. It is essential that the use of the system for air raid warning purposes should not prejudice the efficiency of police communications either in peace or in war. It follows that an enlargement of the police switchboard will be needed if it is to be included in the air raid warning system for other than police activities.

(c) The use of fire alarm systems for air raid warning purposes is to be deprecated as, even though they afford telephone facilities, their use for purposes other than fire calls might embarrass fire operations.

(d) Although radio has obvious advantages for certain purposes, especially for communicating with mobile units, its use is subject to many limitations and must be confined to the special purposes for which it is essential.

(2) (a) The boundaries of the warning districts will be clearly defined and will be confined to a relatively small area in order to restrict the warning messages to a threatened area so as to avoid spreading anxiety and dislocating normal activity more than is absolutely necessary.

(b) The boundaries of warning districts and the location of district warning centers will be fixed by the regional offices of civilian defense of the several regional civilian defense areas, with the cooperation of the signal officers of interceptor commands and the air defense regions of interceptor commands. They will be determined on the basis of facilitating further dissemination of warnings, or existing commercial communications, and the operating methods of the aircraft warning service. They may be a city, a group of cities, a county, or in areas having few targets for hostile aviation a group of counties. In populous areas they should be not less than 15 miles square.

d. Principal Features of the Civilian Air Raid Warning System.—The principal features of the civilian air raid warning system are as follows:

(1) The maintenance by certain specified telephone exchanges and civilian air raid control centers of warning lists of those officials and establishments designated to receive warning messages in the event of a threatened air attack.

(2) One source in each air defense area from which air raid warning messages will be issued.

(3) The communication systems of the Nation

# The Civilian Air Raid Warning System

➡  
PRINT  
FORMS ON  
YELLOW  
STOCK

➡  
PRINT  
FORMS ON  
BLUE  
STOCK

➡  
PRINT  
FORMS ON  
RED  
(OR  
PINK)  
STOCK

Office designation .....

Sheet No. ....

## AIR RAID WARNING—YELLOW

	Exchange and/or number	Name of recipient to be advised	Delivered "✓," "DA," "BY," etc.*					
			Date	Date	Date	Date	Date	Date
1								
2								
3								

Office designation .....

Sheet No. ....

## AIR RAID WARNING— RED

	Exchange and/or number	Name of recipient to be advised	Delivered "✓," "DA," "BY," etc.*					
			Date	Date	Date	Date	Date	Date
1								
2								
3								
4								
5								
6								
7								
8								
9								
10								

Time last acknowledgment received .....

Initials of dispatching operator .....

\* Any other difficulties to be recorded on reverse side.

Figure 5



will receive the calls from the information centers and transmit them to the warning districts, which in turn notify the proper sub-districts. Sub-districts will be responsible for notifying individual recipients.

**e. Messages Transmitted Through Special Conference Equipment.**—Special conference equipment and lines should be made available, if the necessity warrants the additional cost to the recipients, to permit a group of as many as 10 people to be called simultaneously and thus increase the number of recipients who may be called by a single person within a short period of time. This special equipment will be particularly applicable in the following localities:

(1) Where the number of recipients is exceptionally large in proportion to the number of people available for transmitting the messages.

(2) Where it is considered important to minimize the delays in transmitting messages to a group of strategic locations.

### 12. EQUIPMENT IN DISTRICT WARNING CENTERS.—

In each district warning center, equipment is provided for receiving air raid messages from the nearby toll office and transmitting these messages to the persons and places authorized to receive them, such as subdistrict warning centers, report centers, siren operators, fire departments, police departments, public utilities, and essential industries. Most of the equipment in these district warning centers will consist of telephone sets, key telephone sets, and key telephone units of the types generally employed for regular telephone usage.

### 13. PROCEDURE AT DISTRICT AND SUBDISTRICT WARNING CENTERS.

**a.** After a message has been received in a district or subdistrict warning center, this message is relayed to all persons and places on the associated warning lists. The method by which this message is relayed may be one of several different methods, depending on the various conditions in this particular locality, and may be broadly classified as follows:

(1) Messages transmitted by district warning center personnel.

(2) Messages transmitted by telephone company central office operators.

(3) Messages transmitted through special conference equipment. (See section 11, subparagraph e.)

In some districts, it is probable that combinations of all three of these methods will be advantageous. However, the selection of the proper

method for each district will depend on studies of local conditions.

**b.** Where air raid messages are transmitted from a district warning center, prepared warning lists are kept in an appropriate location in this center within ready access of the air raid warning officer who receives the air raid messages. After an air raid warning officer receives a message, he distributes the prepared warning lists to those who have been delegated to assist in transmitting the messages, and these people proceed to transmit the messages. Any one person who has been delegated to assist in transmitting the messages should not distribute a particular message to more than 10 recipients. When all recipients on a list have been called, the time of dispatch and the initials of the person who transmitted the messages are also noted.

(1) The lists mentioned above should be on prepared forms, a suggested example of which appears in Figure 5. These forms will be made up in colors corresponding to the type of warning message and kept in such a manner as to be always available. Recipients should be listed in the priority of calling.

**c.** Where the plans for relaying air raid warnings to subdistricts include the services of central office operators, the authorization to transmit such messages will be made by the air raid warning officer in the district warning center. This transmission will be initiated by the telephone company operator immediately upon verification of the air raid warning message by the information center operator. Central office operators designated to transmit air raid warnings will be supplied with the prepared forms for recording calls shown in Figure 5.

**d.** The operator, charged with transferring the air raid messages, will proceed as follows:

(1) One date column, as shown on the forms in Figure 5, will be used for each warning published.

(2) Exchanges or recipients will be called in the order listed.

(3) No attempt will be made to call a recipient by any number other than that listed on the form.

(4) When calling an individual recipient, if no answer is received within 15 seconds, "DA" will be entered in the appropriate date column and the next recipient will be called. This condition should not occur as all recipients must understand that their telephones will be manned continuously.

(5) On receipt of a satisfactory acknowledgment, a check will be made in the appropriate date column.

## The Civilian Air Raid Warning System

(6) On dial systems, the 15-second ringing period should be checked by counting three complete ringing tone cycles.

(7) If a busy signal is encountered, a "BY" is entered in the appropriate date column and the next recipient called immediately.

(8) If no ringing tone is obtained, the number should be redialed at once.

(9) Only two attempts will be made to obtain any recipient.

(10) In the event that no reply is received from a recipient, the air raid warning officer at the district warning center should take the necessary steps to see that the telephone is manned.

(11) In the event that no ringing tone is obtained or any other condition exists, indicating that trouble is present on the telephone system, the air raid warning officer will immediately call the operator, attempt to obtain connection through her, and, in addition, report the trouble previously encountered.

(12) When the last recipient on the list has been called, the attendant will make a second attempt to reach those showing "DA" or "BY" opposite their names.

**14. EQUIPMENT IN SUBDISTRICT WARNING CENTERS.—**  
In general, the telephone service to subdistrict warning centers will be regular exchange telephone service. In special cases, equipment like that provided for district warning centers may be found necessary.

### **15. PREPARATION AND MAINTENANCE OF WARNING LISTS.**

#### **a. *Recipients of messages.***

(1) The persons to receive the warning messages in each warning district will be recorded, together

with their telephone numbers, on warning lists.

(2) Since the recipients will not be the same for the preliminary caution (yellow), and lights warning (blue), or action warning (red), there will be three lists for each district, one list for the preliminary caution, one for lights warning, and another for the action warning. Obviously, some names will appear on all lists.

(3) As the speed of distribution of the messages is dependent on the lists not being too long, strict control will be exercised over the selection of those who may be included on them.

(4) The compilation of these lists is a responsibility of the heads of the civilian air raid warning organizations. These lists must be kept constantly under revision.

(5) Those included in the warning lists must comply with the following conditions:

(a) Telephones may be scheduled in the lists only if it is certain that, in time of war, they will be manned continuously day and night and will be answered promptly.

(b) Air raid warning messages received are not to be passed to persons in a different warning district.

(c) Recipients of the preliminary caution or lights warning are not to make it known by telephone or otherwise, except for the purpose of completing the preparatory measures for which the warning was conveyed to them. In the case of special factories, which are given the preliminary caution, the employees are not to be warned by means of signals which would be audible outside.

(d) The following is a suggested list showing the class of individuals and establishments together with normal priorities that should properly be included in warning lists as the recipients of warning messages:



## The Civilian Air Raid Warning System

Recipient	Preliminary Caution (Yellow)	Priority	Lights Warning (Blue)	Priority	Action Warning (Red)	Priority
1. Local civilian defense authorities . . . . .	yes	1	yes	1	yes	1
2. Local civilian government officials . . . . .	yes		yes	3	yes	
3. Operators of public warning signals . . . . .	no		no		yes	1
4. Fire stations . . . . .	yes	2	yes	3	yes	3
5. Police stations . . . . .	yes	1	yes	1	yes	1
6. First-aid stations . . . . .	yes	4	yes	5	yes*	4
7. Decontamination squads . . . . .	no		no		yes*	4
8. Hospitals, all types . . . . .	no		yes		yes*	4
9. Public utilities:						
a. Railroads . . . . .	yes		yes		yes	
b. Dock facilities . . . . .	yes	2	yes	3	yes	2
c. Electricity generating plants . . . . .	yes	3	yes	2	yes	3
d. Gas works . . . . .	yes	3	yes	4	yes	3
e. Water works, pumping stations. . . . .	no		yes		yes*	4
f. Communication facilities . . . . .	yes	2	yes	2	yes	2
g. Oil refineries and storage plants . . . . .	yes	4	yes	5	yes*	3
h. Defense works dealing with high explosives, in- flammable or toxic materials . . . . .	yes	2	yes	3	yes	3
i. Blast furnaces or similar establishments . . . . .	yes	2	yes	2	yes	3
j. Factories of national importance or those em- ploying more than 500 persons . . . . .	no		yes		yes*	5
k. Schools . . . . .	(see note)	2	(see note)	4	yes*	2

(Note.—In places where the local government has not provided ample shelter near the school, preliminary warning should be given.)

\*Only if not within earshot of a public signal.

## Chapter IV.—PUBLIC WARNING SYSTEMS

### 16. PUBLIC WARNING SYSTEMS.

a. The available instruments used to give warnings of suitable types fall into three main classes. They are steam sirens and whistles, rotary sirens fed by compressed air and with power-driven rotor (compressed-air sirens), and electrically driven rotor sirens in which the air input is generated by the rotor alone (self-generating sirens).

(1) Steam sirens require a steam generating source, but they are not affected by the failure of electrical power.

(2) Compressed-air sirens require a source of compressed air and power to turn the rotor. The power is usually electricity.

(3) Self generating type sirens require power to turn the rotor. The usual power source is electricity but the rotor can be driven by an internal combustion engine. In the latter case, starting equipment must be constantly ready for use.

b. These instruments should be practically instantaneous in operation. They should give a note or range of notes of adequate loudness within the frequency range of 400–800 cycles and should be capable of making the necessary signals. They should be of a design not easily liable to go out of order, of a construction not liable to damage by weather or foreign bodies, and of a size and weight which permits their being erected at a height. Other things being equal, the source of power should preferably be in the same building as the instrument.

### 17. LOCATION OF SIGNALS.

a. The question as to where a public warning signal should be provided should be considered broadly along two lines. In towns where the population is scattered a complete system of public signals may not be practicable or necessary. In such areas the information that air raiders are in the neighborhood may be conveyed by telephone to someone in the village, such as the local police chief, who will then be in a position to warn those directly concerned to stand by. But this need not be done by a warning system. In small country towns, hand-operated sirens may be used.

b. In localities where an important factory or other establishment which might attract bomb-

ing is situated in an isolated position, the warning signal provided in the premises themselves should be of sufficient power to warn those living in its immediate vicinity.

c. In industrial areas where public warning signals are to be provided, the first step should be to give consideration to the existing sirens and whistles in the district on the assumption that, in war, their use for any purpose other than air raid warnings will be discontinued. Any which give reasonable range of effective audibility will be allocated for air raid warning purposes. A map of the district should then be marked to show the areas regarded as effectively covered by each of the selected instruments. Suitable steps should then be taken to fill the gaps.

d. Factory whistles not included in the layout of public warning signals will be sounded after the public signal has been heard or the air raid warning has been officially received for passing on the warning to the operatives in the factory and for supplementing the scheduled public signals. The use of factory whistles for purposes other than air raid warnings will be prohibited in war.

e. Where any considerable area has to be covered, the minimum number of large signaling devices is preferable to a multiplicity of small signaling devices which in time of war would increase the number of points to which orders for sounding warnings would have to be transmitted and the personnel necessary to man these points.

f. The signaling devices will be so spaced as to give an effective warning over the whole area intended to be covered.

g. The range and effective coverage of signaling devices must be considered when plans are made for their installation. In many cases cost and operation will be factors which must be considered. It is desirable that these signals have a source of power in the same building with the alarm device.

### 18. TYPES OF SIGNALS.

a. It is not necessary to aim at distinctive or peculiar sounds for air raid warning signals. Recognition of the signal from any sound source can be secured by a standard code of blasts,



coupled with the attentiveness to such signals which can be assumed under war conditions and the prohibition of the use of similar sound signals for ordinary industrial purposes.

b. Whatever type of signal is used for public warning signals, the code used will be as follows:

For the air raid warning, air raid message—red.

A signal of 2 minutes' duration consisting of either a fluctuating or warbling signal of varying pitch in which the frequency range is not less than 10 percent above and below the mean pitch, the complete cycle of each fluctuation to extend over a period of 3 to 8 seconds, or a succession of intermittent blasts of about 5 seconds' duration separated by a silent period of about 3 seconds.

For the all-clear signal, air raid message—white.

A continuous signal of 2 minutes' duration at a steady pitch.

### 19. TELEPHONE CONNECTIONS.

a. Provision will be made in the plan of the local civilian defense area for a telephone connection to the point of operation of signaling devices to be used for public warning signals, where such connection does not already exist.

b. Each signaling device will be manned continuously by someone who is accessible by telephone and who can operate the signaling device within a maximum of 10 seconds after receipt of the telephone message.

### 20. OTHER COMMUNICATION REQUIREMENTS.

a. The transmission of air raid warning messages is only one of a multiplicity of signal communica-

tion functions required in connection with civil air raid precautions. Under war conditions the civil air raid control organization will be of considerable size and will be required to administer all phases of this work, each phase of which will require the employment of some agency of signal communication.

Examples of such work are:

Fire control.

First aid.

Rescue work.

Control of lighting.

Reporting damage.

Highway clearance.

Additional phases as dictated by local conditions.

For all of these functions considerable communication facilities will be required, but these will be of the present standard types readily available and the existing local plant will be utilized insofar as is practicable. In the promulgation of local defense plans, civilian air raid warning officers must coordinate closely with the representatives of the communication companies for their particular localities.

b. It should be pointed out that all communication facilities will be taxed to the utmost by the operations of the air raid precautions organizations listed in paragraph a above. Each community or locality will constitute an individual problem, depending upon the facilities available. It may be necessary to impose certain restrictions in the use of communication facilities by other than official personnel.

## Chapter V.—TRAINING

**21. GENERAL.**—It will be appreciated that the object of all training is not only to enable each individual to attain personal efficiency in the type of work for which he or she has volunteered, but further, to build up by progressive stages that degree of combined efficiency which will enable each part of the organization to work as a team.

The organization of training on sound, progressive lines is also of importance in maintaining the interest of the volunteers and helping to foster that team spirit without which true efficiency cannot be attained.

The suggestions put forward in these notes are meant for general guidance. There is obviously much scope for local initiative in devising practical and interesting training and exercises. Every encouragement should be given to such developments, provided they are based on sound general principles.

**22. TRAINING STAGES.**—It will be found generally convenient to arrange that training should proceed by the following stages:

a. Individual training, the object of which is to enable every volunteer to attain practical training and such theoretical training as is necessary in the work of that branch of the organization to which he or she is attached.

b. Collective training, the object of which is to afford practice for trained individuals as a team in accordance with the organization laid down.

c. Combined exercises, the object of which is to afford practice for groups of trained teams in order to insure proper coordination of services and the cooperation of teams whose work may be interdependent.

It is advisable to carry out combined exercises first on a small scale, and gradually to increase their scope until it becomes practicable to exercise the complete organization together.

d. Refresher courses, the object of which is to bring individuals and teams up to date and insure that their efficiency is maintained.

It is realized that circumstances may make it difficult to proceed on exactly the lines suggested above. It is important, however, to avoid exercises or other forms of training which are over-ambitious or in advance of the capabilities of the volunteers at that time.

**23. HINTS TO INSTRUCTORS.**—All training should be progressive, starting with elementary work and leading up systematically to more advanced work

in accordance with the progress of the individuals and teams under training. It is important to insure that volunteers have reached a reasonable degree of individual practical efficiency before the more advanced stages of training are attempted.

In giving actual instruction particular attention should be directed to the following points:

a. **Type of Instruction.**—Theoretical and practical instruction are both necessary but the instructor must adjust the balance between these two aspects very carefully and with particular regard to his class.

b. **Method of Instruction.**

(1) **Theoretical.**—Theoretical instruction should include lectures and study of prepared instruction sheets and similar material, illustrated where possible by models, sketches, or diagrams. Care must be taken, of course, that any illustrations are technically correct.

(2) **Practical.**—This type of instruction should include the practical application of matters dealt with in the theoretical instruction, such as use of warning lists, execution of forms, preparation of reports, and similar tasks. In order to retain their interest it is desirable that the members of the class should be given something practical to do at as early a stage as possible in their training.

**24. COLLECTIVE TRAINING.**—Collective training should be started slowly at first, speeding up as each member learns his part. At intervals it is helpful if members exchange duties with each other, so that they can more readily master the work of the teams and be prepared to take on another member's duties if the need should arise.

Collective training should be progressive. It is important that such training should be made as realistic as possible and should reproduce conditions likely to arise in any emergency.

**25. GENERAL.**—Instructors should aim at short periods of instruction. Lectures should seldom exceed 45 minutes, with another 15 minutes for questions and discussion.

For lectures, classes need only be limited by the accommodations available and the ability to hear and see clearly. For practical work, however, the numbers should rarely exceed 20.

Wherever possible, the instruction should be by demonstration. Lengthy verbal explanations should be avoided, as they make it difficult to retain the attention of the class. As soon as the instructor has given his demonstration, the class should, if possible, practice until they become proficient.









# **THE CONTROL SYSTEM OF THE CITIZENS' DEFENSE CORPS**



**UNITED STATES  
OFFICE OF CIVILIAN DEFENSE  
WASHINGTON, D. C.**

# FOREWORD

*The purpose of this pamphlet is to supply the necessary instructions for establishing and operating a local civilian protection control system.*

The control system is simply the *instrument* by which the Commander, Citizens Defense Corps, with his staff manages the operations of the civilian protection organization under air-raid conditions.

The information in this pamphlet is necessarily stated in rather general terms, since the control problem will vary widely according to the location, size, and existing facilities of each community. It may be necessary to deviate to a considerable degree from the suggestions in this pamphlet as the plan which is finally prepared and adopted in a particular community, must, of course, be designed to meet local conditions.

If the community is in a danger zone, it is important to get some workable control system functioning as soon as possible. Revisions and perfections can be added later. In times of danger the poorest system in operation is better than a perfect plan which is still on paper. We must not have "*too much, too good, too late.*"

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# I. WHAT IS A "CONTROL SYSTEM"?

Every *organization* is composed of groups of workers, each of which has a special function to perform. To be effective these groups must operate in a *coordinated* manner. Coordination can be attained only through the exercise of *command* by a single person who is responsible for the final results of the organization as a whole. In the local civilian-protection organization the relationship between the Commander and the functional groups is shown in Illustration No. 1.

In small organizations command can be exercised by the issuance of orders face to face, that is, directly from the Commander to the individuals who are to carry out the orders. In large organizations, composed of many units, operating at widely scattered points, some means must be devised to enable the Commander to know all that is happening in the area under his jurisdiction and to transmit his orders quickly and accurately to all units of his command. This system is known as a *control system*.

*The principal functions of a control system are as follows:*

- (a) To provide the Commander and his staff with a headquarters;
- (b) To keep the Commander supplied with a picture of the situation in the field;
- (c) To transmit his orders quickly and accurately.

## II. PLANNING THE CONTROL SYSTEM

### A. Importance of Planning.

By a plan in this case we mean the scheme devised in advance for accomplishing the objectives of an organization.

It is impossible to overestimate the importance of careful planning. For every hour spent on planning untold advantages may accrue through the saving of life and property.

The knowledge that every foreseeable contingency has been provided for will build up confidence in the local civilian protection system as a whole.

### B. Responsibility for Planning.

The Control System is the only means whereby command may be executed. Therefore the planning and developing of the Control System is the responsibility of the Commander of the Citizens Defense Corps (or the individual of equivalent authority in the local civilian protection organization).

He should appoint a Controller to prepare a Control System plan for his approval. The Controller subsequently will be responsible to the Commander for installing and operating the Control System.

### C. Studying the Problem.

Study of the problem should cover the following:

1. Planning material issued by the Office of Civilian Defense;
2. Local civilian protection problems and organization;

3. Local factors affecting the control and coordination of civilian protection services, including the following:
  - (a) distribution of population
  - (b) location of stations and depots from which civilian protection services will operate
  - (c) communications facilities in general
  - (d) political boundaries
  - (e) mutual aid plans between nearby communities
  - (f) topography of the area

## **D. Preparing the Plan.**

The plan should be reduced to writing and should cover the following points:

- (I) General statement of local control problem;
- (II) Relationship of control system to the other units of the local civilian protection organization;
- (III to VII) The balance of the plan may follow the subject headings of this pamphlet under the corresponding Roman numerals.

Of course, the local plan should outline specific plans and formulate concrete instructions, whereas this pamphlet necessarily deals in general principles, definitions, plans, and suggestions. An essential feature of such plans should be the assignment of responsibility for the execution of every part thereof to some specific individual or group.

## **E. Approval and Issuance.**

After approval the plan should be distributed to all those—

1. Who are responsible for executing the plan;
2. Who must be familiar with the plan to perform their duties.

# **III. THE CONTROL CENTER**

The control center is the most vital point in the local civilian protection organization. *It is the heart and nerve center of civilian protection in action.*

## **A. Functions of the Control Center.**

To serve as a headquarters for the Commander, Citizens Defense Corps, and his staff and to provide facilities for the performance of the following functions:

1. Receipt of air raid warning messages from the air raid warning district center.
2. Transmittal of such messages to the proper recipients.
3. Issuance of the signal for sounding air raid alarms.
4. Receipt of reports of air raid damage from wardens, etc.
5. Dispatch of operating units to bombing incidents.
6. Collecting and supplying of information essential for the operating of the civilian protection services under emergency conditions.



## RELATIONSHIP BETWEEN THE COMMANDER AND THE FUNCTIONAL GROUPS

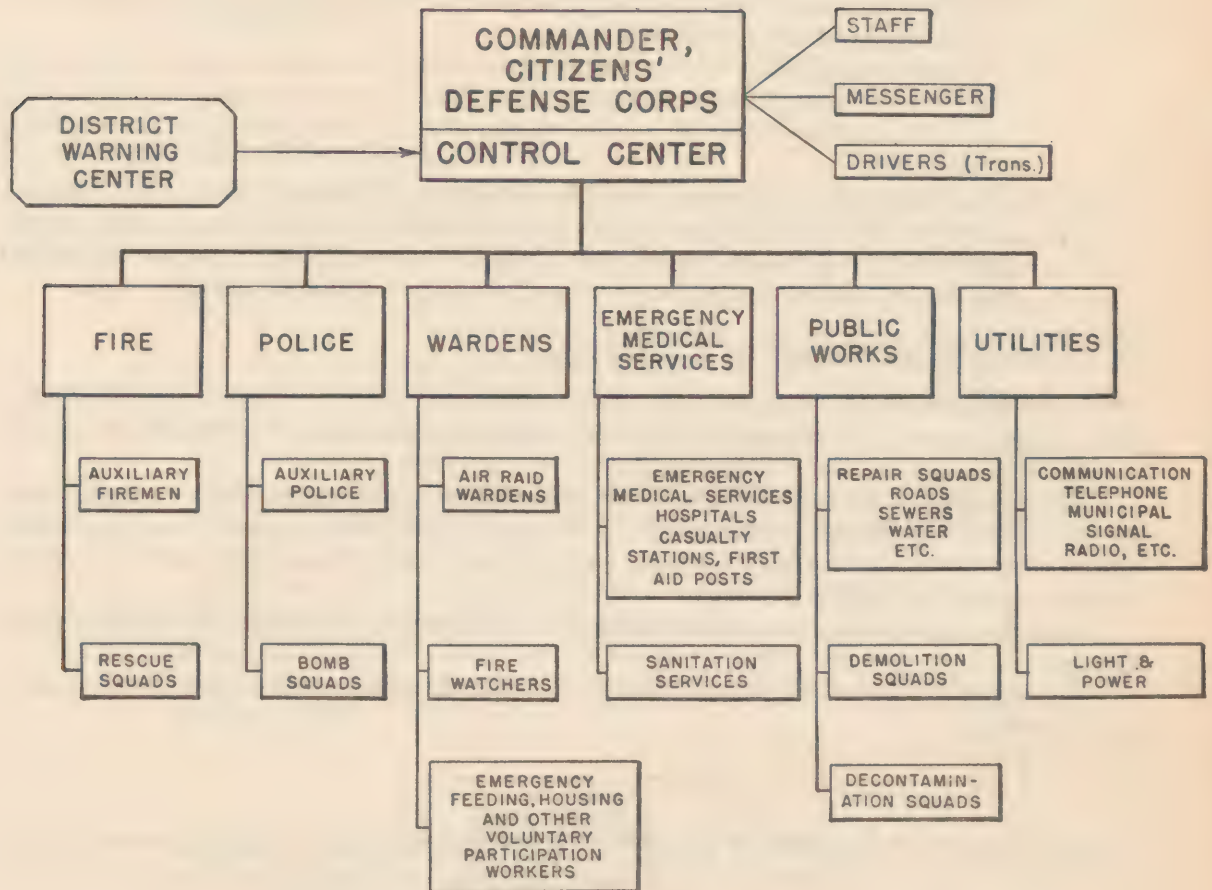


ILLUSTRATION NO. I

## B. Geographical Area.

The area to be included in a control center district depends entirely on local conditions. There is no simple rule of thumb which can solve the problem.

Some of the factors to be considered are as follows:

1. Population—Generally speaking there should be one control center to serve an urban population of 100,000. However, wide variations may properly occur.
2. Where several small nearby cities have joined together under a single working plan, their respective services may be effectively and usefully operated from a single control center.
3. Small cities which are not located conveniently close to other cities may find it necessary to establish independent control centers.
4. Political boundaries will have to be considered where adjoining communities have not worked out some mutual aid plan.
5. In large communities which require more than one control center, existing city subdivisions should be considered, such as those for fire and police services, and it is highly desirable that the control system district coordinate with these existing boundaries.
6. The topography of the area should be studied for significant factors. For instance, where a river with but one or two bridges bisects a community, it might be disastrous if the crossings were destroyed and it became impossible for action parties on one side of the river to help a severely damaged section on the other side.

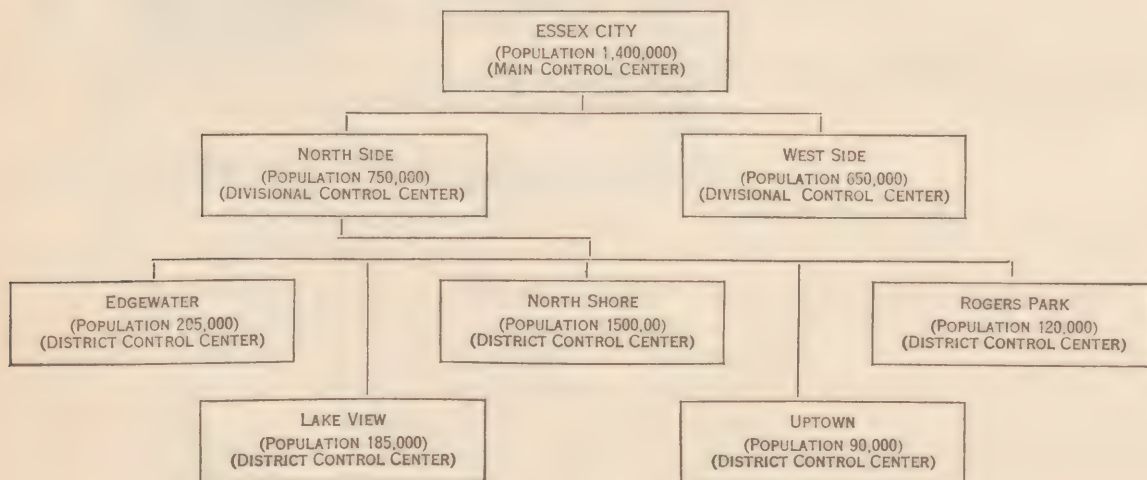
## C. Number of Control Centers.

In communities requiring more than one control center, it will be necessary to establish a main control center to coordinate action in the community as a whole, the subordinate control centers being known as *district control centers*.

The functions of the main control center will parallel on a broader scale and a higher level the functions of the district control centers. However, it will receive reports from the district control centers, rather than from wardens, and will control the movement of services between districts, rather than within a district.

A single main control center should suffice for cities requiring less than 10 district control centers.

For communities requiring 10 or more district control centers, a plan somewhat as follows may be used:





## **D. Location.**

Some of the factors to be considered in selecting a location for control center are as follows:

1. Availability of suitable accommodations.
2. Protective construction factors as referred to in Section E below.
3. Use of municipal signal center of the existing fire or police services. This has the advantage of being close to at least one important operating facility and having available existing equipment and personnel trained in emergency operations.
4. Headquarters of municipal government; this has the advantage of being close to municipal personnel who may be used in manning control center; it is convenient to the headquarters of the various municipal departments.
5. In small communities the headquarters of the volunteer fire department may be especially useful.

## **E. Protective Considerations.**

The question of protective construction is very extensive in itself. Here we will mention only a few general considerations affecting the locating and establishing of the control center.

1. The building should not be of the type built with "load bearing" walls.
2. It is desirable that it be located on a floor which is at least three full stories from the top of the building (for partial protection against some types of damage), but not on the first floor (because of danger from flying glass and splinters).
3. It should be possible to control access effectively in order to prevent sabotage.
4. Basements are desirable provided that:
  - (a) There is no danger of flooding.
  - (b) The grade is above water, gas, and sewer mains.
  - (c) The ceiling supports are sufficient to bear the collapsible load of the rest of the building.
  - (d) There are two exits which have direct access to the outside.
5. The building should be of fireproof construction.
6. Arrangement should be made for black-out and gas-proofing.
7. Adequate arrangements should be made for protection against bomb splinters and flying glass.

## **F. Accommodations Required (for a Control Center Serving a Population of 100,000).**

### **1. Persons:**

#### **(a) Staff Personnel:\***

Commander, Citizens Defense Corps  
Executive Officer (second in command)  
Controller (see par. b, below)  
Personnel Officer  
Property Officer  
Transport Officer  
Billeting Officer

---

\* Staff Functions are defined in the Staff Manual, Citizens' Defense Corps.

### Chiefs of Emergency Services:

Fire  
Police  
Wardens  
Medical  
Public Works  
Utilities

### Messengers, Drivers, and Clerical Staff

#### (b) Control Center Personnel:

Controller.....	1
Plotting Officer.....	1
Panel Clerk.....	1
Records Clerk.....	1
Communications Officer.....	1
Radio Aide.....	1
Telephonists.....	10
Inside Messengers.....	4
Guard.....	1

#### (c) Visitors:

Only officials properly identified by a pass signed by the Commander Citizens' Defense Corps should be admitted to the control center.

#### 2. Facilities:

- (a) Sanitary facilities
- (b) Lockers
- (c) Some canteen provision
- (d) Some provision for recreation and relaxation should be made to maintain morale during periods when workers are on duty but inactive.

## G. Room Layout.

The room layout will depend on the shape of the rooms available. For a control center serving a population of 100,000 there should be three rooms as follows:

1. *Waiting room* for messengers, drivers, etc.
2. *Message room* where communications services will be centered.
3. *Control room* in which will be located the Commander, his staff, the Controller, Plotting Officer, Panel Clerk, Records Clerk. For a typical room layout see Illustration No. 2.

## II. Equipment.

### 1. INTERNAL WARNING SYSTEM.

A warning system should be installed so that the control center staff may know the degree of warning in effect at any time. In each of the three rooms there should be an electric bell and a set of four lights corresponding to the degrees of warning—yellow, blue, red, and white. The system should be controlled in the message room. The bell is rung and the appropriate light switched on as each warning or "all clear" is received.



# TYPICAL ROOM LAYOUT OF CONTROL CENTER SERVING A POPULATION OF 100,000

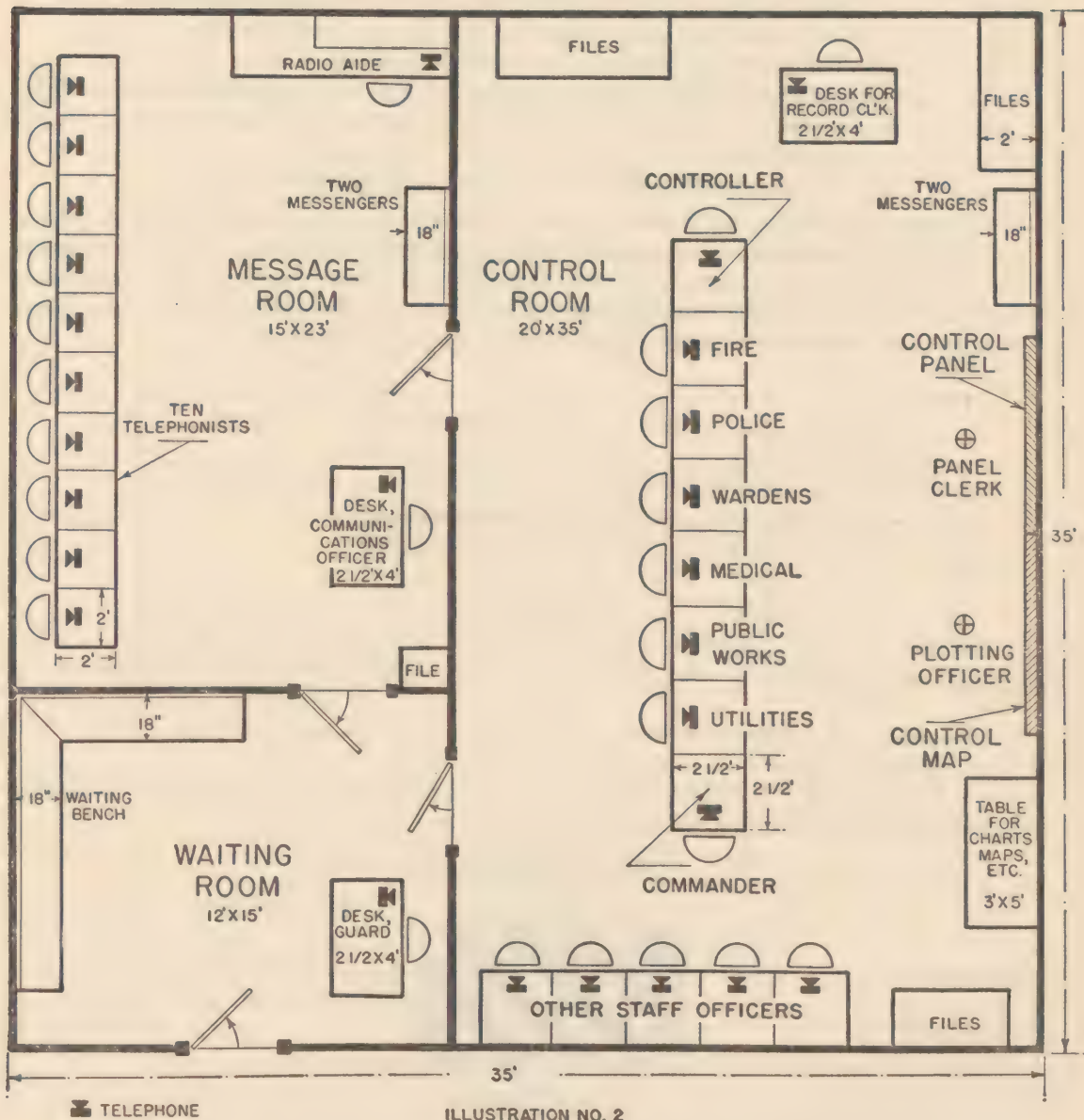


ILLUSTRATION NO. 2

## 2. MAPS.

### Control maps and pins.

A master map should be prepared on as large a scale as possible—24" per mile is appropriate—covering the entire area served by the control center. This map should be mounted on beaver board, soft wood, or similar substance to permit the insertion of colored pins and other markers. A duplicate map should be kept in a safe place in a separate building.

The following items should be shown on the map:

- (a) Significant topographical features, such as rivers and mountains;
- (b) All streets with some indication of relative street numbers;
- (c) Highways, railroads, etc., properly identified;
- (d) Stations, depots, and headquarters of various civilian protection services;
- (e) Location of wardens' posts with post number and boundaries of sectors and precincts;
- (f) Fire and police call boxes with identifying number.

There should also be provided a set of pins to indicate the location and type of bombing incidents on the map. These pins should be in four different colors to indicate type of incident. There should be 100 pins of each type and each set of colored pins should be numbered from 1 to 100. These pins are kept on a board at the side of the control map in the following arrangement:

BLUE	RED	YELLOW	GREEN
High explosive bomb	Incendiary bomb	Gas bomb	Unexploded bombs, fallen aircraft, etc.
1	1	1	1
2	2	2	2
3	3	3	3
4	4	4	4
etc.	etc.	etc.	etc.

There also must be provided a set of road blockage pins of a distinctive design. (See Illustration No. 3 below.)

### ROAD BLOCKAGE PIN

(3 times actual size)



ILLUSTRATION NO. 3



### 3. CONTROL PANEL. (See Illustration No. 4.)

The control panel is necessary to enable the officer in charge at all times to have a complete visual record of the number and disposition of the action parties under his control. The control panel consists of two essential parts:

1. The left-hand side of the panel will provide space for a large paper chart or blackboard showing the following information:

Number of Bombing Incidents	Location	Type of Damage	Time of Incident	Remarks
-----------------------------------	----------	-------------------	---------------------	---------

2. The right-hand side of the panel should be constructed of the same type of material as that on which the map is mounted. The lower portion of the right hand side of the panel will be equal in height to the chart referred to above and will be marked with extensions of the lines showing the incidents. The lower part of this side will be divided vertically into two parts marked respectively "Services Dispatched" and "Services Needed." These two parts will be separated by a small column in which the incident numbers are repeated to allow quick, accurate reading of the panel. Each part will then be subdivided into eight columns corresponding to the eight principal types of services as listed below. In the upper portion of the panel above the "Services Dispatched" columns will be inserted pins, numbered to identify the individual units. Each set of numbered pins will be of a distinctive color to identify the type of service, as follows:

Fire	Red
Police	Blue
Emergency Medical Units	Red and White
Ambulances	White
Rescue Squads	Orange
Decontamination Squads	Yellow
Repair Squads	Green
Demolition Squads	Black

In the board above the "Services Needed" columns will be a number of pins colored to represent the types of service. These pins, of course, will be unnumbered.

### 4. PRINTED FORMS.

1. *Warning lists.*—These are explained and forms suggested on pages 12–15 in the pamphlet entitled "Air Raid Warning System," issued by the Office of Civilian Defense.
2. *In-message Form* (see Illustration No. 5).—This form should be provided in triplicate, tinted white, pink, and green.
3. *Out-message Form* (see Illustration No. 6).—This form should be prepared in triplicate, tinted white, pink and green.

### 5. LOG BOOK.

A log book is necessary to provide a permanent record of the essential information on each incident. (See Illustration No. 7.)

### 6. CLOCKS.

Clocks should be installed in each of the three rooms and should be visible from every part of the room. These clocks should be of a type that will not stop if the power supply is interrupted and should be set and synchronized daily through the telephone exchange.

### 7. MISCELLANEOUS EQUIPMENT.

Miscellaneous equipment such as desks, chairs, benches, scratch pads, pencils, auxiliary lighting system, flashlights, etc.

[illegible]



# "IN" MESSAGE FORM

Date \_\_\_\_\_

Initials of Telephonist \_\_\_\_\_

Report of Air Raid Damage: yes no (cross out one)

Reporting Agent: (Warden, Police Officer, etc.) \_\_\_\_\_

Warden's Sector Number \_\_\_\_\_

Position of occurrence: \_\_\_\_\_

Type of Bombs: High Explosive ☐

Incendiary ☐

Poison Gas ☐

Casualties: (approx. no.) \_\_\_\_\_

Any trapped under wreckage: yes no (cross out one)

Fire: (If reported write word "FIRE") \_\_\_\_\_

Damage to Mains: Water ☐

Gas ☐

Overhead Electric Cables ☐

Names of any ROADS BLOCKED \_\_\_\_\_

Position of any UNEXPLODED BOMBS \_\_\_\_\_

Time of occurrence:(approx.) \_\_\_\_\_

Services already ON THE SPOT or COMING \_\_\_\_\_

Remarks: —

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Time message completed: \_\_\_\_\_

Message no: \_\_\_\_\_

## 12



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ILLUSTRATION NO. 7

13

## IV. COMMUNICATIONS SYSTEM

To properly operate the control system of a Civilian Defense organization, a positive, accurate, and dependable Communications System is a vital requirement. Because of its high degree of availability, flexibility, and dependability, the land line telephone is being relied upon as the basic medium of communication. Additional communications channels will be provided by Municipal Signal Systems, Amateur Radio, Messenger services, Broadcast Radio, and such other facilities as are locally available.

### ***A. Basic Planning of the Communications System.***

Basic planning involves (1) the establishment of an efficient Communication System for the organization as a whole, (2) utilizing effectively the available existing facilities and, (3) guarding against possible conflict between Civilian Defense and other vitally important national defense communications. Military requirements for communications facilities take precedence.

Since the communications installations of the Control System are highly technical, the heads of the local communications agencies should be called upon to assist the Controller in developing the communications system. Inasmuch as the land line telephone is being relied upon as the basic medium of communication, it is essential that the local telephone company be consulted at the outset. In communities where the municipal signal system has attained a high degree of development and efficiency, it is highly important that the superintendent thereof be called upon to assist in this planning problem.

The assistance of other communications agencies should also be obtained including broadcasting stations, telegraph companies, local amateur radio groups, etc.

After study of the general Control System plan, a survey should be made of the communications requirements of the local civilian protection organization and of the communications facilities available. With this information a communications system should be fabricated which is adapted and adequate to the needs of the organization it is to serve.

Because of variable conditions affecting communities, it is not possible to establish specifications upon which a Civilian Defense Communications System can be constructed. However, certain requirements will be similar in communities generally, as enumerated below.



## **B. Communications Requirements of a Control Center.**

Adequate communications must be maintained at all times and under all conditions between the Control Center and:

- (i) Points Outside the Control Center Area.
  - Air Raid Warning District Center
  - Higher Control Center (if any)
- (ii) Points Within the Control Center Area.
  - (a) Wardens Posts, etc.
  - (b) Regular and auxiliary fire stations
  - Regular and auxiliary police stations
  - Hospitals and casualty stations
  - Sanitation services
  - Depots (Repair, Demolition Transportation, Decontamination squads, etc.)
  - Municipal Signal headquarters
  - Emergency Feeding and Housing units
  - Air raid warning devices, etc.
  - (c) Points vulnerable to sabotage, i. e., bridges, power stations, reservoirs, strategic industries
  - Utilities (gas, electric, water, etc.)
  - Transportation systems, etc.

In view of the many individuals and activities with which the Control Center must maintain contact, the Communications System should be extremely flexible. Maximum flexibility of the installation may be accomplished by providing ample individual lines and the use of regular-message telephone service. In addition, provision should be made for alternate routing service, wherever practicable should any main cable or trunk line be rendered temporarily inoperative.

An adequate number of telephones and lines must be provided to activate and control all of the operating units of the organization under conditions of maximum activity. The telephone services required by a Control Center serving a population of 100,000 might require 27 lines, assigned to the following individuals:

Commander  
Executive Officer  
Personnel Officer  
Property Officer  
Transport Officer  
Billeting Officer

Controller  
Records Clerk  
Communications Officer  
Radio Aide  
Telephonists  
Guard

### **Chiefs of Emergency Services**

Telephones in the Control Center should have nonpublished numbers, known only to persons authorized to call the Center. Six or seven of the telephonists' lines would be consecutively numbered so that calls from Wardens, etc., would be completed to any one of the group of lines which is idle. The remaining lines of the telephonists would be excluded from this group so as to make them available for outgoing calls.

### **C. Communications Requirements of Wardens.**

Warden sectors should be carefully surveyed for existing telephone facilities, and arrangements made for the use thereof at strategically located points. In addition, telephone installations will be required at the Wardens posts and headquarters of supervising Wardens.

In all cases it is mandatory that wardens have immediate access to all telephones selected for their use on a twenty-four-hour basis.

### **D. Communications Requirements of Operating Units (Fire Service, Demolition Squads, Etc.).**

A survey should be made of the telephones available for use at the locations where these organizations are established, to insure that they adequately meet Civilian Defense requirements, and additions or rearrangements made as required. At least one telephone should be available at every such location.

### **E. Communications Requirements at the Scene of an Incident.**

The telephones ordinarily used by the Wardens Corps may be utilized for contacts between the scene of an incident and the Control Center. Messengers may be used by the Incident Officer to carry messages to and from those telephones for further transmittal to the proper destination. In case the telephones adjacent to the incident are not operative because of damaged cables, a police car equipped with two-way radio or an amateur operator with portable two-way radio telephone equipment could be dispatched to the scene to maintain communications between the incident and the Control Center.

### **F. Alternate Service Arrangements.**

The Communications System should be so planned that, even in case of damage to certain facilities, delivery of messages may be assured. This may be best accomplished if full use is made of all facilities and channels available for this purpose, and particularly if careful planning of alternate or "stand-by" service is effected.

#### *(1) Alternate Telephone Arrangements.*

Each unit of organization (Wardens, Control Center, Rescue and Repair groups, etc.) should, if facilities permit, be provided with alternate telephone arrangements in the event that one or more of the instruments in general use becomes inoperative.

#### *(2) Municipal Signal Systems.*

Where such service is available, the opportunities for putting it to Civilian Defense use should be thoroughly explored. It can often be used both as a primary service to meet specific requirements in connecting fire and police services, and also as a "stand-by" service in case of temporary interruptions in commercial telephone service. Any use that can be made of the Municipal Signal System will, of course, lighten the burden on the commercial telephone facilities. If Civilian Defense messages are to be superimposed on the Signal System, precautions should be taken to prevent adding any undue burden which might slow up the emergency communications for which the System was primarily installed.



### (3) *Amateur Radio.*

The performance record of Amateur Radio operators during peacetime disasters indicates that they are resourceful, adept at improvisation and possess a high sense of community service. Considering this, the Communications Officer may consider it desirable to enlist the services of amateur operators within the community, most of whom, if not all, will provide their own radio equipment. The equipment for use within the Civilian Defense Communications System will be portable-mobile UHF radio telephone sets, thus providing for maximum flexibility of this important communications channel. Upon completion of the enlistment of such operators and their equipment, a survey should be made as to the best means of employing this service. All operation must conform with the rules and regulations of the Federal Communications Commission.

It must be thoroughly understood that all amateur radio stations are subject at all times to being ordered closed or to cease transmitting. This function is not within the jurisdiction of Civilian Defense organizations. Orders to close a station (other than temporary silence) will emanate only from the Defense Communications Board. Orders to remain silent (for temporary periods) will emanate only from the Interceptor Command of the air defense region within which the community is located, or the Federal Communications Commission (or their representatives). Authority to reopen or resume operation will emanate from the same source which directed the closing or silencing.

In general, this service should be utilized to parallel locally the telephone installations connecting the most essential services, i. e., Control Centers, Incident Officers, Fire and Police service, etc. In addition, a pool, or group of pools, should be formed, located at strategic points from which one or more of the amateur operators could be dispatched with their equipment to bridge a gap, should any part of the telephone or Municipal Signal System be rendered temporarily inoperative by equipment failure or bombing. Under no circumstances shall such amateur equipment be used without specific authorization from the Communications Officer.

In organizing this phase of the System, care should be taken to carefully select operator personnel on the basis of individual experience and the equipment in their possession or which they are prepared to provide.

In order to obtain maximum use of amateur radio, the Communications Officer may wish to appoint as a member of his staff the local Emergency Coordinator of the American Radio Relay League (a nation-wide organization), or his equivalent in individual amateur groups, whichever may be available in the community.

### (4) *Residuary Wire Service.*

Such services include stock ticker systems, central burglar alarm systems, local teletype networks, networks for transmitting music to restaurants, such as wire program services, etc. These services might prove to be effective in disseminating information to locations where large groups of people assemble, such as schools, churches, restaurants and amusement centers. A complete survey should be made of these facilities to determine their proper place in the over-all communications plan. In the case of large cities having many public, parochial, private and other schools, some special arrangements may be required for the dependable simultaneous transmission of emergency messages to them. The use of these facilities, of course, should be carefully controlled so as to avoid unnecessary disturbances of the normal life of the community.

### (5) *Broadcast Radio.*

Radio broadcasting stations will assume a vital responsibility in the dissemination of information in providing non-operational contacts with the general public. The possible uses thereof should be fully explored by the Communications Officer to determine its maximum effectiveness within the limits allowable for such service.

It must be thoroughly understood that all broadcasting stations are subject at all times to being ordered closed or to cease transmitting. This function is not within the jurisdiction of the Civilian Defense organization. Orders to close a station (other than temporary silence) will emanate only from the Defense Communications Board. Orders to remain silent (for temporary periods) will emanate only from the Interceptor Command of the air defense region within which the community is located, or the Federal Communications Commission (or their representatives). Authority to reopen or resume operation will emanate from the same source which directed the closing or silencing.

(6) *Messenger Service.*

See Handbook for Messengers, issued by the Office of Civilian Defense.

### **G. Four Broad Suggestions:**

1. In order to insure successful organization of the System, care should be taken to select a competent Communications Officer, skilled in the administrative control of communications.
2. To avoid unnecessary depletion of available communications facilities, full use of those existing and operative should be made prior to the acquiring of any new equipment or lines.
3. To avoid delay in equipping the System, full use should be made of standard telephone and other equipment on hand.
4. Insure that definite arrangements have been made by the Telephone Company for the emergency handling of Civilian Defense calls.

## **V. PROCEDURE**

It is much easier to understand clearly *how* something must be done when one knows *why*. Accordingly the following general principles are provided.

1. There must be an exact procedure for every action, in order that a minimum of choice is needed under operating conditions. Failure to establish a definite procedure is apt to result in "orders, counterorders, disorder."
2. Every effort must be made to bring to a focus in a control room all the essential information necessary for the Commander and his staff to make decisions.
3. The Commander and his staff should be relieved of all worry about problems of internal operation.
4. The maximum of speed should be obtained.
5. Accuracy is even more important than speed.
6. The work should be divided in such a way that each individual may become a skilled expert in his particular assignment.
7. Printed forms are used to simplify the work so that a minimum of thinking is required under operating conditions. It reduces the possibility of error resulting from misunderstandings arising from spoken instructions.



## **A. Alerting the Local Civilian Protection Organization.**

A district is alerted when the appropriate military commander notifies the civilian authorities in an air-defense region that the enemy is capable of delivering an effective attack on their communities.

When a region is alerted, three persons should be on duty at each control center at all times and a full shift should be available on call.

## **B. Action on Receipt of Air Raid Warning Messages.**

The operation of the air raid warning system is discussed in detail in the pamphlet on that subject. Accordingly, here we will mention briefly only certain items relating to the operation of the control center itself. For purposes of discussion we assume the control center issues all the warnings to ultimate recipients. However, in some communities the warnings may be issued directly by the district warning center or the local fire or police department.

### **1. Yellow Message—*preliminary caution.***

- (a) Summon control center staff to stations.
- (b) Distribute air raid warnings by telephone to those on the "yellow" list, especially the civilian protection services.

(A note regarding the procedure for warning wardens posts may be in order here. It is suggested that one warden in each precinct be warned, that he in turn telephone three other wardens, who in turn will warn the remaining wardens.)

### **2. Blue Message—*lights warning.***

- (a) Complete actions referred to under yellow warning which remain undone.
- (b) Telephone warnings on "blue" list.
- (c) Take necessary steps to insure protective safety of control center, such as checking of locks on doors, splinter protection, and the like.

### **3. Red message—*action.***

- (a) Sound public air raid alarm devices.
- (b) Remove all unnecessary papers and clear desks for action.
- (c) Make final check of all personnel and equipment in control center.
- (d) Each member of the staff should make certain that the materials with which he must work are ready for instant use.

### **4. White message—*raiders passed.***

Sound all clear signal.

## **C. Initial Reports of Bombing Damage.**

### **1. Action at incident.**

When a bombing incident occurs, the warden makes a very quick survey of the situation and immediately dispatches an initial report. This message is transmitted by telephone to the control center.

### **2. Receipt of initial incident reports at control center.**

The telephonist at the control center receives and records the warden's report on an In-Message Form—in triplicate (Illustration No. 5).

### 3. Distribution. (See Illustration No. 8.)

A messenger takes the three copies of this executed form to the Communications Officer who inserts a message number (messages are numbered in order from the beginning of each calendar day), retains the green copy for the files and hands the other copies to the messenger. The messenger carries these two copies into the control room and hands them to the Plotting Officer.

### 4. Action in control room.

#### (a) The Plotting Officer.

- (i) The Plotting Officer's primary duty is to give an identifying number to each incident reported. This task is much more difficult and exacting than it sounds, and inaccuracy in numbering may result in serious consequences. In the majority of cases one message only will be received, but duplicate or supplementary messages may be received in quite a number of incidents. Two or more wardens acting independently, and possibly from different sectors, may observe and report the same incident, or a warden having reported an incident may find it necessary to report further details of damage previously omitted.

Once the Plotting Officer has definitely ascertained that the incident has not previously been reported, he marks the message with the next available number. He hands the Controller the white copy.

- (ii) The Plotting Officer should, by using a properly colored pin numbered to correspond with the incident number, indicate on the map the location and type of incident. He should also show on the map any road blockages which have been reported.
  - (iii) Having done this the Plotting Officer hands the pink copy to the Panel Clerk.
- (b) The Panel Clerk inserts the essential information regarding the incident on the left hand side of the panel, places his initials on the copy, and passes it to the Record Clerk.
- (c) The Controller.

- (i) Meanwhile the Controller\* (who has the white copy) will have read the message aloud.
- (ii) The Controller will decide what services are needed and probably will send a nucleus of services—for instance, a fire squad, rescue squad, and Emergency Medical Field Unit. The Chief of each service, or his adjutant, will indicate the unit to be called. The Controller records this decision on an out-message form (Illustration No. 6) in triplicate. He retains the white copy. The messenger delivers the pink copy to the Panel Clerk and the green copy to a telephonist.
- (iii) The Panel Clerk indicates the services needed on the Control Panel by moving the appropriate pin or pins from the space above the "Services Needed" section to the proper place below. When this is done the Panel Clerk hands the pink copy to the Records Clerk who keeps a current file of all uncleared messages.

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\*Actually, of course, the Commander may elect to perform these and the following functions personally, but he usually will assign such duties to the Controller, issuing general instructions from time to time.



# FLOW OF IN MESSAGES

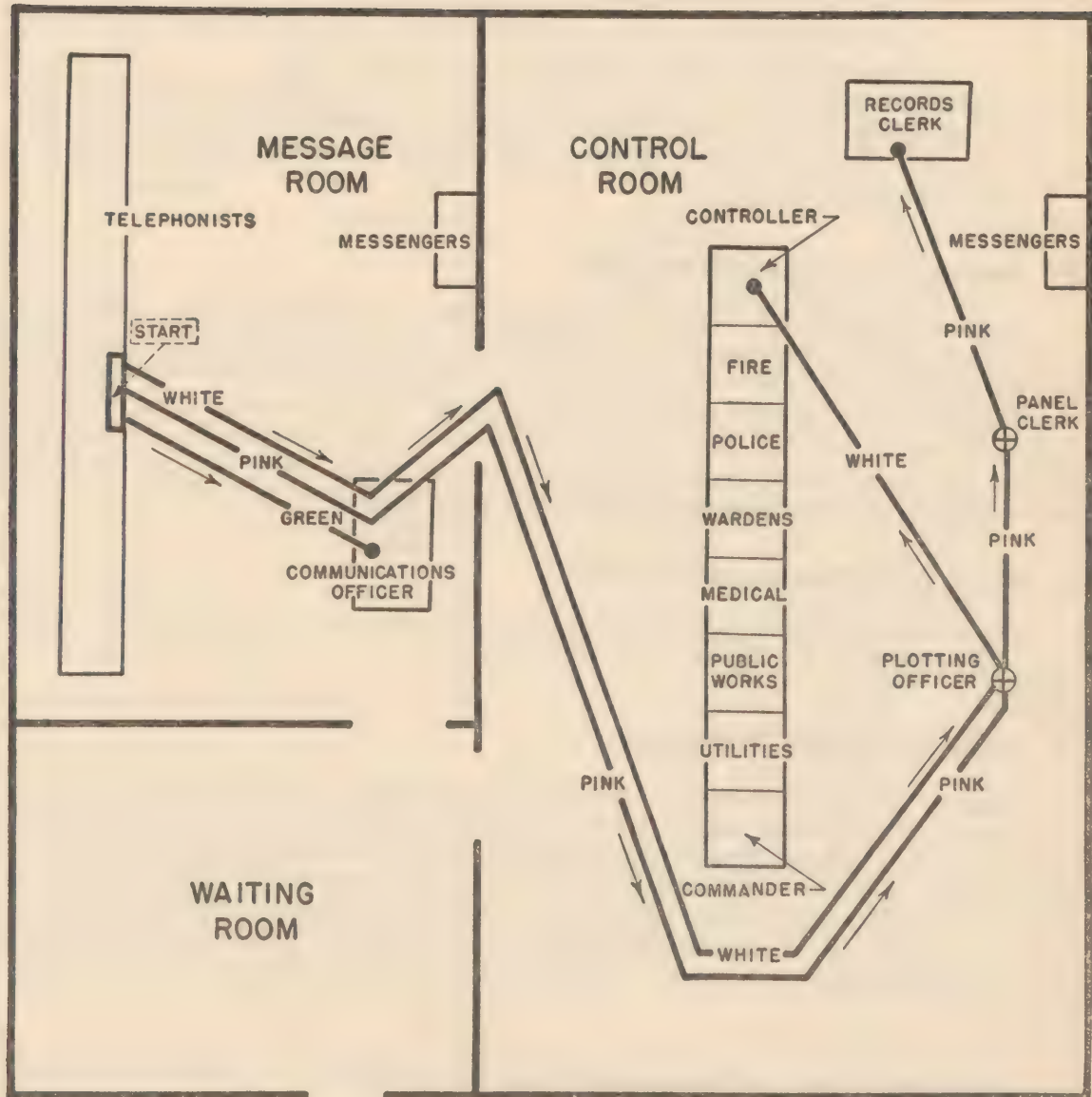


ILLUSTRATION NO. 8

5. Dispatch of out-messages. (See Illustration No. 9.)

- (a) The telephonist, who has received the green copy, delivers the message, checking each item, and when all the information has been delivered to the proper recipients, initials the form and inserts the date and time delivery was completed.
  - (b) The messenger takes the green copy to the Communications Officer who inserts a message number. The messenger then delivers it to the Panel Clerk who indicates the type and identifying number of the service units dispatched by moving the appropriate pin or pins from the space above the "Services Dispatched" section to the proper place below. He then hands this green copy to the Record Clerk who places it with the pink copy.
6. Meanwhile the Chiefs of Services will have decided what additional action is required. They will execute out-message forms in triplicate indicating the service units to be dispatched. These out-message forms will be initialed by the Controller, if he approves, and handled as above.

### **D. Supplementary Reports.**

Supplementary reports include all messages from a bombing incident following the initial report but not including the final report. These supplementary reports are mainly calls for assistance and are handled in the same manner as the initial reports of bombing damage.

The next higher control center should be advised of the number of service units in action at frequent intervals (possibly every twenty minutes) in order that it may know whether the control center concerned may need reinforcements, or whether it may be in a position to send out some of its reserves to aid some other control center district.

### **E. Call for Reinforcements.**

When the control panel shows reserves are dangerously low, a request should be made to the next higher control center for reinforcements.

### **F. Service Unit Reports.**

When service units return to their stations or depots they should immediately report to the control center in order that they may be used at other incidents. This information is recorded on an *in-message form* by the telephonist, but its flow through the control center is different from that shown in Illustration No. 8. The green copy goes to the Communications Officer. The white copy goes to the Controller. The pink copy goes to the Panel Clerk, who indicates a service unit's withdrawal from the scene of an incident by removing their identifying pin to the upper portion of the panel. The Panel Clerk then hands the pink copy to the Records Clerk.

### **G. Final Incident Reports.**

When all service personnel and equipment have left the bombing incident, the incident may be considered "cleared". All markers covering the incident may be removed from the map, except those showing unrepaired damage, which may affect subsequent civilian protection operations. The appropriate entries are made in the log book and the incident reports may then be placed in a permanent file.



# FLOW OF OUT MESSAGES

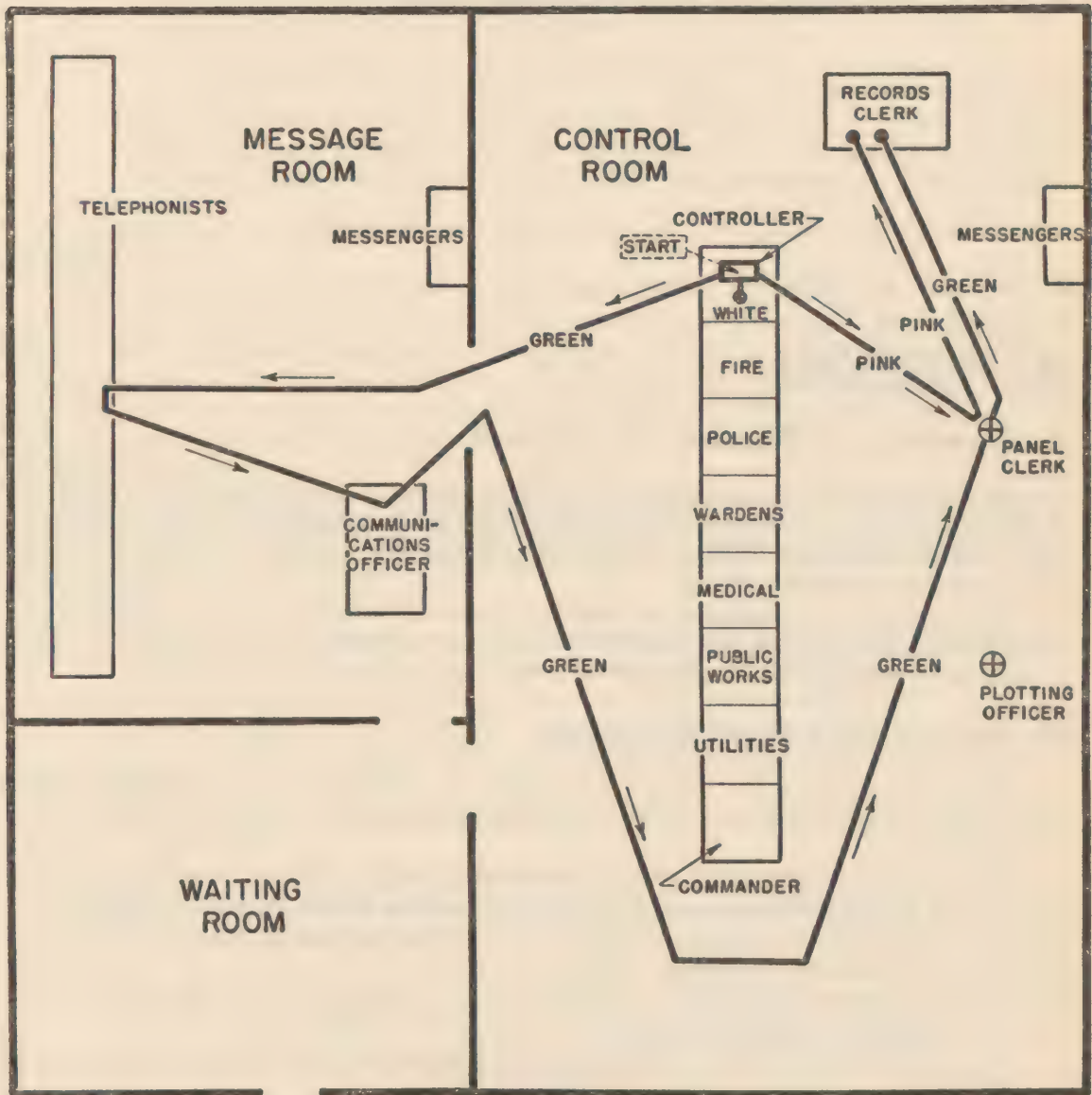


ILLUSTRATION NO. 9

## **II. Final Situation Reports.**

Twice a day comprehensive summary reports outlining developments and the general situation in the control-center area should be dispatched to the next higher control center.

## **I. Miscellaneous Messages.**

*In-and-out-message* forms, other than those referring to air-raid damages and the dispatch of operating units, may be used for miscellaneous messages.

# **VI. PERSONNEL**

## **A. Number of Persons Required.**

Approximately 21 persons will be required to operate a control center in a community of 100,000 persons. If all these workers are volunteers, it is desirable to limit shifts to four hours. If operations are conducted on the basis of six shifts per day, a total of 126 persons will be required for duty each day.

At least three persons should be capable of handling the work in each position in order that all functions can be taken care of in the event of temporary loss, absence or incapacity of personnel, pending the summoning of reserves.

## **B. Duties and Qualifications.**

The control center is the most critical point in the whole local civilian protection system. Accordingly, the personnel must be of the highest caliber and of unquestioned loyalty to the United States.

The *Controller* is responsible to the Commander, Citizens Defense Corps, for the proper operation of the control system and succeeds the Executive Officer in order of command. In addition to the Controller, there will be a Deputy Controller and enough Assistant Controllers to man all shifts. His duties will be as follows:

1. Plan the control system and recommend such changes in the basic plan as may be necessary from time to time;
2. Select, train, and test personnel for the Control Center Staff and assign specific duties to each control-center worker;
3. Maintain a Duty Roster to insure that the Control Center is always properly attended and supervised;
4. Coordinate all messages and be responsible for keeping the Commander advised of the situation, when the Commander is not actually at the control center;
5. Be responsible that the Control Center is properly guarded, properly protected against enemy action, and adequately equipped.



*Qualifications.*—He should have ability as an organizer, a personality which commands respect and obedience, and the qualities of a leader. In action, he must be able to analyze situations quickly and make definite decisions encompassing all elements of the problem.

The *Plotting Officer* is responsible for maintaining a clear picture of the bombing situation on the control map. More specifically his duties are as follows:

1. To locate and number the position of each incident on the map, insuring that two or more messages relating to the same incident are so identified, and to mark the in-message form with the incident number.
2. To call the attention of the Controller to road blockages.

*Qualifications.*—Accurate and detailed knowledge of the control center district and the civilian protection operations plans. During inactive periods he should become thoroughly familiar with all parts of the area. He should have a mind sufficiently keen, accurate, and quick to deal with a message at maximum speed.

The *Panel Clerk* is responsible for the operation of the control panel. He should be quick and careful.

The *Records Clerk* during active periods must keep immediately available copies of incoming and outgoing messages by incident number. He should also keep available in his files lists of personnel and equipment, special plans of operations, and other information pertinent to civilian protection activities. He should be able to produce any of such material immediately upon request. After an air-raid period is over he should bring the log book up to date and during inactive periods should classify and file accumulated reports, correspondence, special lists, announcements, etc.

The *Communications Officer* is responsible for the operation of the communications system. In addition to the Communications Officer, there will be a Deputy Communications Officer and enough Assistant Communications Officers to man all shifts. The specific duties of the communications officer are as follows:

1. To arrange the duty roster for all message room personnel so that a small skilled staff is always on duty and a full staff is available at very short notice;
2. To supervise the work of the message room generally, to insure that it is carried out with accuracy and rapidity;
3. To use alternative means of communication when the telephone system breaks down;
4. To see that out messages after being dispatched are promptly returned to the control room;
5. To handle any special problems which may arise in the message room;
6. He is responsible for devising routines to increase the efficiency of internal and external communications systems.

*Qualifications.*—He should be a skilled supervisor, have a thorough understanding of the communications problems and facilities, possess a capacity for administrative detail, and have leadership qualities which will evoke the most efficient cooperation from his working staff during periods of strain.

The *Radio Aide* to Communications Officer has the responsibility of operating the civilian protection radio communications system which may have been provided as part of the communications system. He should work out procedures under the jurisdiction of the Communications Officer to handle messages under emergency conditions with maximum efficiency. He should be thoroughly familiar with the communications, equipment, procedures, and problems.

The *Telephonists* will receive and transmit messages as required, and should:

1. Speak quietly, clearly, and slowly, talking directly into the mouthpiece;
2. Make every effort to attain absolute accuracy, even if it is necessary to read back information to the reporting agent, or to a depot;
3. Be patient, and, above all, should be able to remain calm under the most trying conditions.

*Inside Messengers* should always go to their assigned places on one of the messenger benches, keep their eyes on the telephonists in the message room and the staff members in the control room, being prepared to carry messages as quickly and quietly as possible from one room to another. They should be alert, obedient, and fleet of foot.

The *Guard* should be tactful but firm in preventing unauthorized persons from entering the message or control rooms. He should be armed and deputized.

### **C. Recruitment.**

It has been found that women are especially well qualified to act as telephonists. For the most part men must be used in the control room because the occupations which prepare a man for usefulness in this work are not usually open to women in peacetime.

For positions in the control room every consideration should be given to using municipal personnel who hold similar positions in peacetime, such as municipal communications personnel in the police and fire departments.

### **D. Investigation.**

Every control center worker should be fingerprinted and investigated by the local police department sufficiently to establish that they are loyal citizens and of good character. The investigation should, if possible, cover the past ten years with special reference to the question of whether a worker has been identified with any subversive activities.

### **E. Identification.**

Every worker should be provided with an identification card bearing the following information:

1. holder's signature, photograph, and brief physical description;
2. signature of Commander Citizens Defense Corps, or his deputy;
3. a serial number;
4. the card should be impressed with a seal covering portions of the holder's signature, his photograph, and the card itself; a municipal seal such as that generally possessed by city clerks can be used for this purpose.

Lost or stolen identification cards should be immediately reported to the executive officer of the Citizens Defense Corps.

Arm bands and lapel pins should not be regarded as identification.

### **F. Training.**

Training of the control center staff is of extreme importance because:

- (a) the control center occupies a critical place in local civilian protection, and
- (b) the work is rather technical and cannot be learned without careful preparation.



A manual will be issued on this subject in the near future. In the interim the following outline can be followed to prepare the staff for active duty:

1. *Individual training.*—Each member of the staff should:
  - (a) study general operations of the control center;
  - (b) be trained individually in his particular duties;
  - (c) be tested in the proper performance thereof until it is clear that he can function efficiently as part of the whole system.
2. *Collective training.*—The next step is for the control center staff as a whole to learn to work together as a team. This can be accomplished best through a series of group exercises starting out with relatively simple problems handled at slow speed and working up to more difficult problems handled at the maximum speed consistent with accuracy. At the conclusion of each test, the results should be analyzed for mistakes and a determination should be made as to the best means of eliminating such mistakes under operating conditions.
3. *Combined exercises.*—These are designed to test the operation of the civilian protection organization as a whole. At this time the control center staff will have an opportunity to show how well it can function as an integral part of local civilian protection in action, and can discover what further improvements can be made to perfect the local control system.

## **G. *Esprit de Corps.***

*Esprit de Corps* is an important factor in the success of any organization. In the work of the control system it is absolutely essential, inasmuch as even a slight failure to coordinate and cooperate by the workers may result in serious failures.

No mechanical rules can be followed to develop this intangible but all-important element. It depends on the inner desire of each worker to give the very best possible service irrespective of how difficult and trying conditions may be. It will include a pride in the organization, rather than in personal accomplishment. In a larger sense it must be a reflection of the national consciousness that every individual must do his or her part, and do it well, for the protection and safety of all.

Under emergency conditions absolute discipline must be maintained. This requires instantaneous and unquestioned obedience on the part of each individual to the commands of his or her superior. It also requires that each person issuing orders make sure that they can be carried out and are clearly stated. "An order that can be misunderstood will be misunderstood."

## VII. COOPERATION

The proper working of the control system depends not only upon the efficiency of the individuals within the control center itself, but upon the cooperation of the public as a whole and of the various components of the civilian protection organization.

For instance, the general public should be discouraged from attempting to report air raid damage directly. They should be instructed to report damage to their air raid warden and to follow his direction. During air raids it is probable that virtually all civilian telephones will be cut off and, in each neighborhood only certain telephones will be "alive" and will be available only for the use of members of the civilian protection organization.

Inasmuch as each control system is designed to fit the needs of the local civilian protection organization, every effort should be made to improve its operating efficiency and to change its procedures to meet the changing requirements of the components of the civilian protection organization. After each test exercise the Chiefs of the various services should advise the Controller of any changes which seem desirable to better meet the needs of his service. From time to time reports on the improvements which have been made in the local control system should be submitted to the State Defense Council with a copy for the Regional Office of the Office of Civilian Defense. These reports will enable the U. S. Office of Civilian Defense to have available the practical experience of the individual communities in developing further plans for civilian protection control systems.

## ADDENDA

Since many of the readers of this pamphlet may not be familiar with the Aircraft Warning Service and the Civil Air Raid Warning System (see Illustration No. 10.), the following summary explanations are supplied.

### **A. Civil Aircraft Warning Service.**

1. *Organization.*—The Aircraft Warning Service has been organized by the Combat Command of the United States Army Air Forces for detecting and reporting the presence of enemy airplanes, (a) to enable our own fighting planes to locate and attack hostile raiders and (b) to enable the military authorities to warn communities in the path of invading bombers to activate their local air raid protection systems.

For purposes of air defense, the continental United States is divided into four areas, each under one of the four Air Forces as follows:

First Air Force—northeastern United States  
Second Air Force—northwestern United States  
Third Air Force—southeastern United States  
Fourth Air Force—southwestern United States

Each Air Force area is in turn divided into a number of Air Defense Regions. The command post of an Air Defense Region is known as an *Information Center*.

An Air Defense Region is subdivided into two or three smaller areas, each with a central communications point known as a *Filter Center*.



# AIRCRAFT WARNING SERVICE AND AIR RAID WARNING SYSTEM

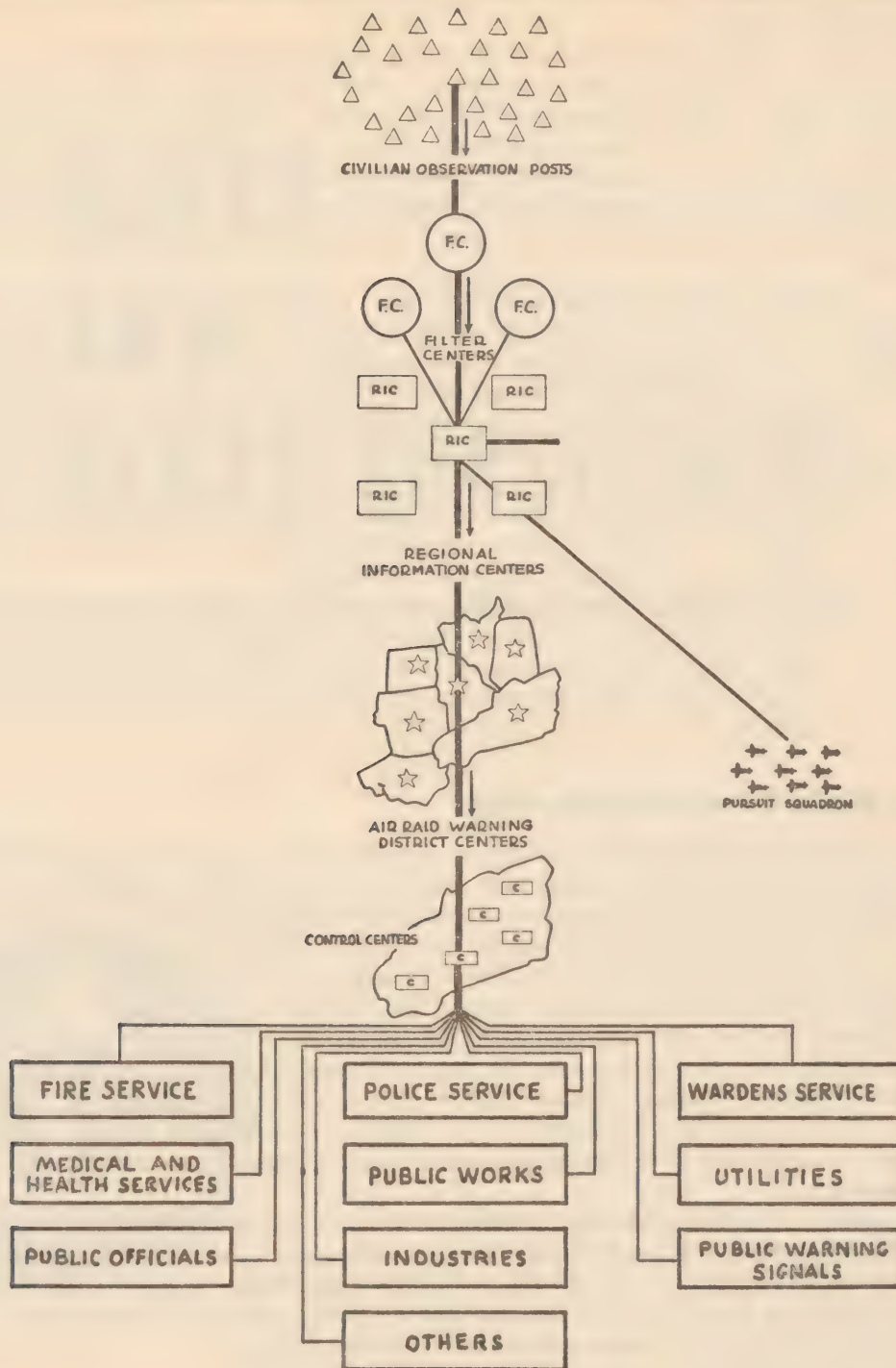


ILLUSTRATION NO. 10

Finally, each Filter Center area is further subdivided into smaller areas (approximately 36 square miles in size) in each of which is located an observation post manned by civilian observers.

2. *Operation.*—When the observer on duty at a *civilian observation post* hears or sees an enemy plane, he immediately telephones to the *Filter Center* a report of the height, speed, direction, type, and number of enemy planes. When this report is received in the Filter Center, a plotter puts a marker on a large map of the Filter Center area. An expert Army officer evaluates the information received from various observation posts and decides the most probable height, speed, direction, type, and number of planes in the enemy raid and indicates his decision by placing a particular kind of marker on the map.

A teller, watching the map from a balcony, telephones to the *Regional Information Center* the data shown by the filter officer's marker. A plotter at the Information Center, on receiving reports of the raid from the Filter Center, indicates this information on an Operations Map, which includes all the filter areas in the operating region.

- (a) *Active defense.*—On a balcony overlooking the Operations Map is the Commanding Officer for the Region (or his representative), who watches the course of the invading bombers and orders into the air from the most logical airdrome in his region, pursuit planes of sufficient strength to effect a successful interception. The pursuit planes are guided by radio to the point where the Flight Commander can sight and attack the enemy.
- (b) *Passive Defense.*—Also in the balcony at the Information Center (in some cases, the Filter Center) is a *Civil Air Raid Warning Officer* who watches the course of enemy planes and by means of the Civil Air Raid Warning System, notified communities in the path of invading bombers to get ready for a possible air raid.

## **B. Air Raid Warning System.**

1. *Organization.*—Each Air Defense Region is divided into a number of Air Raid Warning Districts. These districts may vary widely in size. The maximum area is about 1,500 square miles and the minimum area is about 225 square miles. The boundaries of these districts are also determined in part by established telephone toll service. That is, an Air Raid Warning District will usually cover exactly the same area as one or more of the existing toll center areas. This procedure is based on considerations of efficiency; that is, when the boundaries of the Air Raid Warning District and the toll center coincide, it is necessary for the warning message to go through the least number of toll centers. Messages transmitted to any warning district apply to the whole of that district and to that district only. That is to say, even though an adjoining district might know of the warning, it should not disseminate warnings until it has itself been warned.
2. *Operation.*—The Civil Air Raid Warning Officer referred to above follows the course of each enemy raid, and warns communities in the path of the invading bombers. This message is transmitted over telephone lines from the Regional Information Centers to the Civil Air Raid Warning District Centers from where it is disseminated to the Control Centers of the various communities in the District.



# GLASS AND GLASS SUBSTITUTES

*Protective Construction Series No. 1*



***United States Office of Civilian Defense  
Washington, D. C.***

***Prepared under the direction of the Chief of Engineers, U. S. Army, with suggestions of the National Technological Civil Protection Committee***



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# FOREWORD

*Protective Construction*, Structures Series, Bulletin No. 1, prepared under the direction of the Chief of Engineers, United States Army, and issued by the Division of State and Local Cooperation, Office for Emergency Management, was intended to provide a general idea of the problem of protective construction against aerial bombs.

Additional pamphlets covering specific phases of protective construction will be issued from time to time through the Office of Civilian Defense. They will be intended for the use of persons confronted with the practical problems of protection against air raids and will compose the *Protective Construction Series*. *Glass and Glass Substitutes* is the first of such publications to be issued.

The following is a tentative list of subjects which will be treated in subsequent pamphlets, though not necessarily in the order named:

- Report of Bomb Tests on Materials and Structures
- Communal Air Raid Shelters
- Bomb Resistant Shelters
- Air Raid Shelters in Buildings
- Small Domestic Air Raid Shelters
- Measures of Defense Against Incendiary Bombs
- Structural Design of Factories Involved in National Defense
- Modifications in Existing Buildings to Minimize Effects of Bombs

In addition to the above, it seems desirable to issue at a later date, pamphlets providing more complete information intended for the use of engineers concerned with the major design problems of protective construction. These will be:

- Aerial Bombs
- Penetration of Bombs
- Blast
- Bomb Fragments

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***Protective Construction Pamphlet No. 1***

# GLASS AND GLASS SUBSTITUTES

## ***Introduction***

This pamphlet, the first of the *Protective Construction Series* of pamphlets to be prepared by the War Department, gives advice on the protection of window openings and roof lights. The widespread use of glass in all types of buildings produces a problem of primary importance in providing measures for protection against air attack. The devices described aim at minimizing, as far as possible, the effects of glass splinters rather than the complete preservation of the glass.

The destruction of glass in the vicinity of an exploding bomb is caused by blast, flying bomb fragments or other debris. Unprotected glass is broken over a wide area, and, in the case of a direct hit or near miss, splinters are liable to be thrown with great violence, causing injury to those in the vicinity. In some cases, casualties caused by a light shower of glass are slight or none at all; on the other hand, knife-like splinters of glass can be and have been projected across an area with sufficient velocity to perforate or embed themselves in an ordinary wooden door. The danger of exposure to such possibilities, without a reasonable amount of protection, is obvious.

Apart from damage caused by splinters, the shattering of glass by an exploding bomb may result in exposure of personnel and machinery to weather and the disruption of blackout facilities. Serious delays to production then may be encountered at a time when other damage is insignificant.

Roof lights are subject to damage by falling shrapnel from anti-aircraft shells, as well as by blast and fragments, and require extensive protective measures. When it becomes necessary to maintain continuous operation during air raids, adequate protection should be provided to insure against unnecessary casualties.

# I. EFFECTS OF HIGH EXPLOSIVES ON GLAZING

## *Blast and Splinters*

**General**—The first effect of explosion of a heavy bomb consists of expansion of hot gases with great force and rapidity within a radius of 25 to 50 feet. A high positive pressure is built up, creating a violent disturbance of air up to a radius of 200 feet from the explosion. This pressure causes the rapid movement of air along lines of least resistance, causing extensive damage to windows and roof glazing. In addition to complete destruction of glass in the immediate vicinity of the explosion due to blast and splinters, destruction may occur at considerable distances where the vibration frequency of the blast waves approaches the natural frequency of the glass. The extent of the outer area cannot be defined because the shock wave may be broken up and reflected from obstructions or carried through the earth with the result that windows near the explosion may be less damaged than those farther away.

No method has yet been developed to prevent glass from being fractured. Glass embedded with wire mesh is only slightly more resistant to blast than plain glass, but the splintering effect is considerably less. Laminated glass also reduces splintering, but may be blown completely out. Instances have occurred in which the entire window frame has been blown across a room without injury to the glass.

## II. TYPES OF PROTECTION

For practical purposes, window protection may be considered under two heads, (1) against near effects, and (2) against distant effects. Many windows will be subject to distant effects and glass can be protected under these conditions. Protection against near effects will provide for both blast and fragments. For this reason, extensive measures are necessary and the complete removal of windows and the use of substitutes may be required. Damage to window glass may be minimized by leaving the window open but in many cases this will not be practical.

Protection should be provided in accordance with the degree of occupancy and the importance of material to be protected. For most glazing the risk of near effects must be accepted, and protection against distant effects only is practicable.



## **A. Protection Against Near Effects**

**1. General**—When blast occurs, the force will be exerted against all surrounding objects and those objects of least resistance will be subject to major displacement. Blocking is the easiest and cheapest method of affording protection to exposed window openings in such a case. Blocking consists in making a protective wall of sandbags, brick, concrete, or material confined by forms, the thickness of which will not be less than that specified in Table No. 4, *Protective Construction*, Bulletin No. 1. Where there is no objection to the continuous exclusion of daylight, windows may be blocked up to the top. Where it is desired to leave a partial opening, the blocking should extend at least 6 feet above floor level, or to a height sufficient to protect machinery or other contents. Window blockings may be erected on the ground, on a dry base, or on platforms and should extend beyond the sides of the window opening for a distance of not less than the thickness of the type of blocking used. They may be bonded or anchored to the wall, but care should be taken to assure that they will not allow dampness to penetrate the building. A layer of roofing felt or other impervious material between the blocking and the wall should be used. A free space between the blocking and the wall will prevent dampness, but then the window will be exposed in some degree to blast. All blockings should be adequately protected from the weather by means of roofing felt or other suitable materials.

Other protective measures such as movable shutters may be employed to cover the window opening.

**2. Blocking Windows**—Following are a number of methods for blocking windows:

**a. Brickwork**—The window opening should be bricked up 12 inches thick to give adequate protection (figure 1) or at least as thick as the building walls, if less than 12 inches thick. In some instances, in improvising shelter a lesser thickness of wall may be sufficient to afford considerable resistance since it will generally be impracticable to make the building walls the required thickness. However, where possible and essential, an existing building wall that is not 12 inches thick could be made so by application of a brick veneer properly anchored to the existing wall in order to lessen any degree of risk. The window frame may be removed and the window built up solid, or if the window is left in position the brickwork should overlap the wall and a suitable foundation should be provided. New brickwork should be properly bonded to the existing walls. Where upper floor windows are to be bricked up, the existing lintel over the opening below should be checked for strength on account of the additional weight imposed.

**b. Frame obstructions**—A form, containing any suitable material providing the necessary resistance against splinter penetration, may be erected outside a window (see figure 2). This may consist of 24 inches of broken stone or gravel or 30 inches of sand or earth. The



frame should be anchored to the wall, should be sufficiently braced, and should extend beyond the sides of the window opening a distance of not less than the thickness of the obstruction. All top soil should be removed at the base of this structure.

*c. Gravel-filled planking*—In making gravel-filled planking, the window sash or glass should first be removed. Then planking may be placed on the external and internal faces of the wall and held in place by through bolts or cross timbers, the intervening space being filled with gravel (see figure 3). For protection according to standard requirements, the wall thickness should be not less than 24 inches. However, gravel-filled planking may be used on the windows of upper floors in walls 12 inches thick where it will give a reasonable amount of protection because of the oblique angle at which fragments usually strike. The planking should be prepared in separate units for each side of the wall. One or two boards should be left loose at the top of either side for convenience in filling. The top can be filled by gravel in bags rammed into place. In general, the lumber used in this method should be fairly heavy, say 2-inch plank and 3x6-inch battens. However, the size of the window to be protected and number of battens employed will govern, to a great extent, the sizes of lumber to be used. The planking should be held together by bolts through the battens.

*d. Sandbags*—A sandbag barricade, as shown in figure 4, is a readily available and initially cheap means of protection, but it deteriorates quickly and will therefore require replacement which does not favor its use for economical reasons. For emergency use these requirements will be followed:

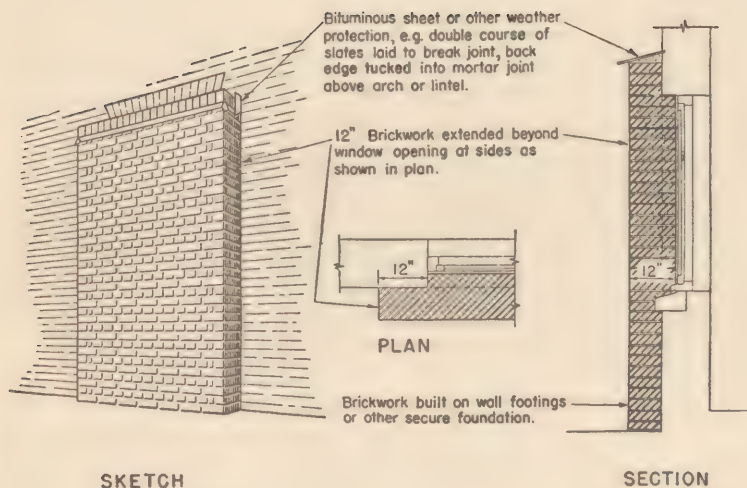
Bags should be three-quarters filled, the necks either sewed or turned under. They should be laid in alternate courses of headers and stretchers and should be tamped in place. A batter not steeper than one in four should be provided on all exposed surfaces. Boards should be placed over the window opening prior to erection of the barricade. A dry base should be provided and a covering to protect against weather should be placed over the finished barricade. Unless properly protected, sandbagging will cause dampness in walls and interiors.

*e. Other Methods*—Precast concrete blocks, shown in figure 5, may be utilized in constructing barricades. If hollow, these may be erected and filled with broken stone, gravel, sand, earth, bricks, or concrete, as desired. A suitable foundation should be provided.

Solid precast concrete blocks may be made to fit window widths and bolted in place, making them specially suitable for protecting windows in upper floors (see figure 6). Bearing may be had on the window sill and an extension incorporated in the block will provide overlap on the outer wall. Lumber not less than 4 inches thick against the inner wall, bearing on fish plates and securely bolted, will anchor the closure sufficiently. The glass will need to be removed.

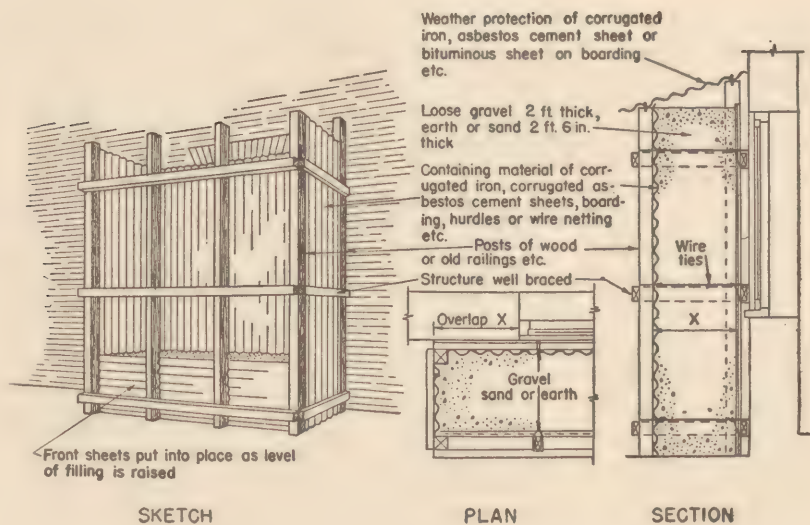
If not less than 3 feet thick, lumber stacked solid gives protection but is likely to be removed for other uses unless sufficient storage stocks are available in the vicinity.

Barricades of sand or earth between board forms should normally have low maintenance costs and should be comparatively simple in erection with available material and labor. Stacked brick between board forms will offer almost complete salvage value.



← **FIG. 1**  
**WINDOW BLOCKING**  
**WITH BRICKWORK**

**FIG. 2 →**  
**A FRAMED BARRICADE**





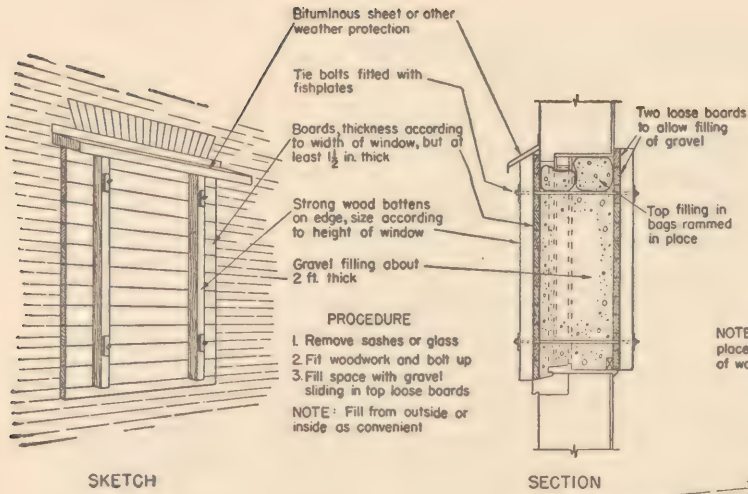


FIG. 3

## GRAVEL-FILLED PLANKING

NOTE: Bags should be three quarters filled, the necks turned under the bag and placed inside the wall, the bags being tamped into place with a mallet or piece of wood. Seams should be placed inwards as far as possible.

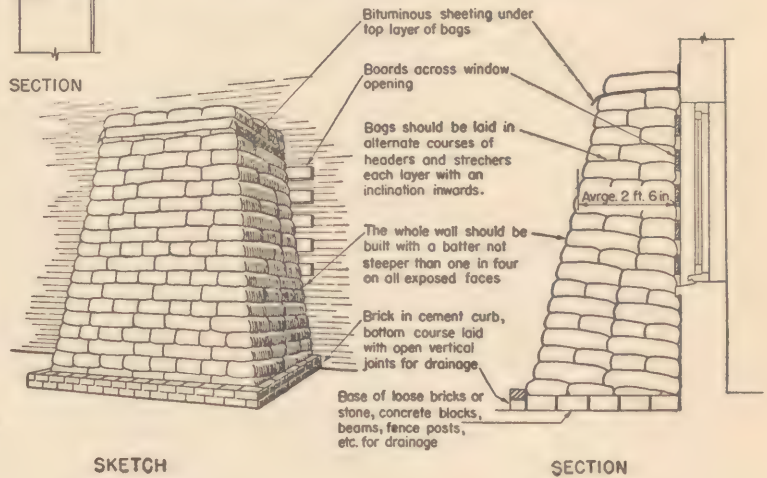


FIG. 4

## A SANDBAG BARRICADE

Note: Concrete and gravel together give standard protection. Blocks are laid with horizontal mortar joints only, vertical joints being left dry.

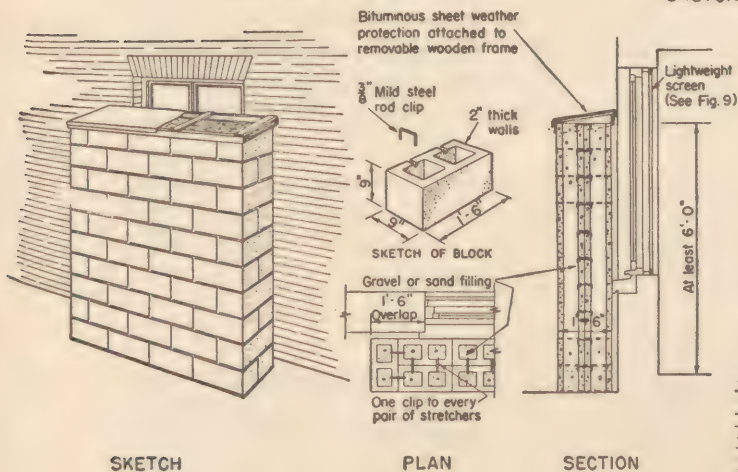


FIG. 5

## A FILLED CONCRETE BLOCK BARRICADE

SKETCH

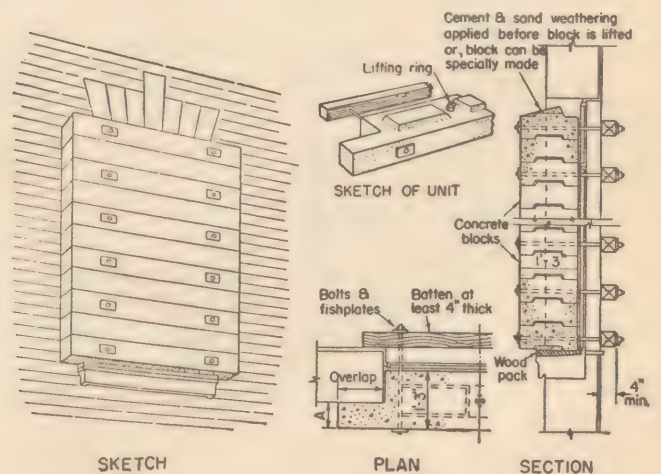
PLAN

SECTION

FIG. 6

## A CONCRETE BLOCK SHUTTER

- NOTES:
1. Bearing on wall at least 8"
  2. Remove sash if necessary for this
  3. Projection A on plan at least 4"
  4. Height of block depends on weight, max. weight of single block - 500 lb.
  5. Overlap 10 to 12"





**3. Design**—In the design and construction of window blockings the following points should be considered:

- a. Stability
- b. Ease of Construction
- c. Cost of Construction
- d. Cost of Maintenance
- e. Availability of Materials and Labor
- f. Cost of Demolition
- g. Salvage Value of Material

Obviously the latter two factors are not of immediate interest, but it is well to keep them in mind when deciding on the type of barricade to be used.

**4. Lightweight Shutters**—A steel shutter capable of resisting fragments of a 500-pound bomb at a distance of 50 feet will require a thickness of  $1\frac{1}{2}$  inches. However, a reasonable amount of protection will be provided by a shutter of  $\frac{1}{2}$ -inch mild steel which will resist about 75 percent of the fragments from heavy bombs. Resistance increases rapidly with distance from the bomb and, in addition, fragments usually strike upper floors at an oblique angle with the effect of increasing resistance to fragment penetration. Shutters should be regarded, primarily, as a means of protection to upper-floor windows where blocking is impracticable. Heavy external shutters on upper floors are difficult to manage and therefore it appears preferable to attach the fragment-resisting shutters on the inside wall face (see figures 7 and 8).

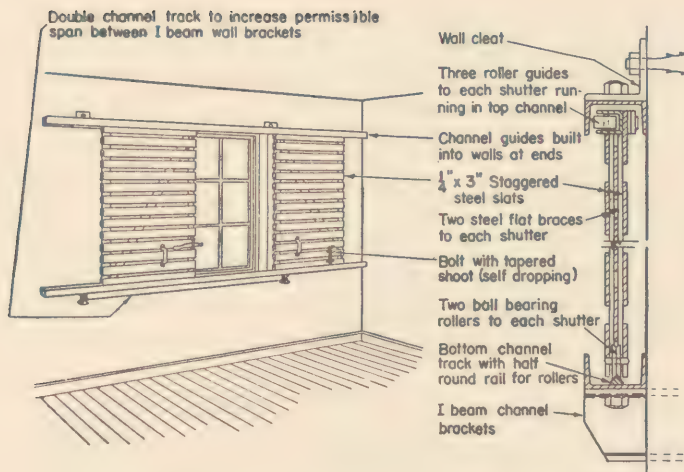
Wood shutters 2 to 3 inches thick will provide a reasonable amount of protection in reducing the effects of blast at distances from 50 to 200 feet where windows are partly shielded from fragments by adjacent walls, area walls of basements, or by external barricades standing away from the windows. Also, when barricades or blocking do not extend the full height of windows, the space above may be covered with wood shutters.

To withstand blast effects shutters must be held firmly, preferably in steel channels anchored with anchor bolts to walls. For very large windows, a strong frame may be placed on the outside to break up the opening into several smaller openings to each of which a shutter should be attached.

Board walls giving less protection than the method previously discussed will be worthwhile in such cases as shop fronts. Where possible, large areas of glass in shop windows should be covered or replaced by 1-inch boarding in which small windows with hinged shutters are provided to allow for display and the admittance of sufficient daylight. This will minimize the damage that might result from the shattering of a large sheet of glass. It would also reduce the problem of more extensive repairs at a later date. In addition to less damage by glass splinters, the smaller display window presents a less difficult problem for maintaining blackout requirements during business hours. The boarding need not have the aspect of severity or roughness but may be treated as a problem in design and with the addition of a few coats of

paint be made to look quite presentable. This type of protection will also serve to protect the interiors and contents from weather and theft when the glass is broken by distant blast effects. Such protection may be forced out bodily but may be readily replaced and repaired. Protection should be provided also for showcases and glass partitions.

As previously stated, the degree of occupancy and the material to be protected, as well as the location of the shop, must be taken into consideration before proceeding with extensive protective measures. Obviously, it would be impracticable to remove entire consecutive rows of shop windows. The local districts surrounding places considered to be of military value would, perhaps, benefit most from the points of economy and protection by such precautions.

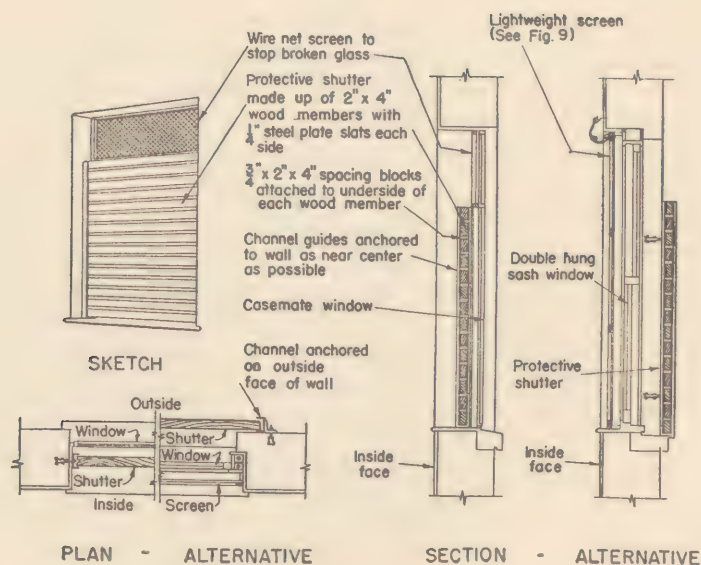


SKETCH  
One leaf is shown in position and the other open on wall face

SECTION

← FIG. 7  
AN INTERNAL SHUTTER  
OF STEEL SLATS

FIG. 8 →  
A STEEL AND WOOD SHUTTER  
(MEDIUM PROTECTION)





## ***B. Protection Against Distant Effects***

**1. General**—Beyond about 200 feet, the chance of glass breakage and the intensity of blast decrease rapidly for effects of heavy bombs generally in use. The ability of glazing to withstand blast pressure in this general radius will depend on the type of glass, its setting, thickness, and size of panels and the degree of protection offered by adjacent walls and other objects. The vibration frequency plays an important part in the ability of glass to resist breakage. The unusual nature of blast effect is demonstrated by the fact that windows have been completely shattered 200 yards from a bomb explosion while windows considerably closer and more exposed were unharmed.

**2. Windows**—Window frames with glass protected by laminated sheets of cellophane, laminated glass, and with a plate of steel protecting the glass have been subjected to intense blast pressures, and in no case has it been possible to preserve the glass.

The best precaution is to remove the window and, if not, to open it and then provide a light frame covered with canvas or similar material which can be lightly wedged into the window opening so it will be dislodged when subjected to blast pressure and then may readily be put back again. Experiments have shown and experience has indicated that leaded glass is somewhat more resistant to blast effects than ordinary glass. However, the use of leaded glass is not generally economical.

**3. Roof Lights**—Roof lights and ventilators present a source of considerable danger because they are not only subjected to blast and hits by bombs but are exposed to falling fragments of bombs and antiaircraft shells as well. The destruction of overhead glazing also adds the immediate problem of weather protection and obscuration of light. The importance of glass protection is emphasized by the fact that there have been instances of serious delays in industry because of shattered roof glass when other damage was insignificant. Protective methods cover a wide field with numerous degrees of protection, and the type of protection to be used will be determined necessarily by individual requirements.

**4. Methods of Protection**—Protective measures are discussed below and include ventilation, gasproofing, protection from flying and falling glass and from the weather after glass is broken, and obscuration and the maintenance of obscuration when glass is broken.

**a. General**—Glass is used extensively for vertical and roof lights in all types of buildings and industrial plants. Vertical windows may be protected up above the height of machinery or other contents of the building and in any event not less than 6 feet above the floor by blocking in the manner previously discussed herein (see figure 5).

**(1) Permanent obscuration**—In cases where permanent obscuration is not objectionable the glass may be coated or removed and the following materials used:



(a) *Roof Glazing*—The glass may be treated externally with burlap and bituminous roofing cement. In addition, the glass also should be supported by wire mesh attached close underneath or by metal or wood transverse supports placed at about 2-foot intervals and touching the glass. This method will give weather protection as well as maintain the efficiency of blackout after the glass has been fractured.

Where the glass has been removed, galvanized flat sheet steel, composite sheets of asbestos and steel, or hard wallboards may be substituted. These materials will stand up to blast pressures considerably greater than those that fracture roof glass. When displaced they can usually be replaced still intact; also, they can be anchored in the same way as roof glass.

Thinner and more flexible materials such as combinations of wire mesh and roofing felt and soft wallboards will probably require supporting underneath with wire mesh netting or transverse supports.

Flat and corrugated asbestos-cement sheeting is readily fractured by blast. Therefore, there is little to be gained by using it as a substitute for roof glazing as it is likely to be shattered before it is displaced.

Wallboards require painting or impregnation with preservatives to give protection against weather.

(b) *Vertical glazing*—The above-mentioned methods described as suitable for roof glazing can also be used in windows. In addition, bituminous sheeting, plywood, and plasterboard can be used. The latter two should be painted on the face and on the edges to prevent the soaking in of moisture. Firm anchoring such as nailing is not desirable. The materials should be held in place by the same methods as those described below, parts I and II, for the flexible substitutes for glass.

(2) *Retention of daylight*—If light requirements make essential the retention of glass in the window, one of the following steps may be taken:

(a) Remove the glass and substitute laminated glass which should be 0.2 inch thick for panes no larger than one square foot and somewhat thicker for larger panes. Laminated glass will stand up to blast pressure if securely set in the frame, and, although it may crack, the celluloid sheets within the glass will keep the window gasproofed and prevent flying splinters.

(b) A flexible substitute for glass may be installed. This should be reinforced by  $\frac{1}{2}$ -inch mesh wire securely fastened to the frame and in contact with the inner surface of the material. This type of protection will withstand considerable blast pressure if properly anchored. If the material is anchored or attached with nails or staples, it will tear at the edges when it is displaced by blast. In addition, if anchored too strongly, it may break in the center. The following methods of anchoring are suggested:

(I) *Wood windows*—The material may be attached on the face of the frame by plasterer's lath or similar wood strip. In such a case care must be taken that the nails or tacks used to secure the laths do not perforate the edge of the material.

The edges of the material may be fastened to the frame by means of adhesive tape.

Ordinary wood glazing beads in the glass rebates may be used for holding the material in place. Care should be taken that the material is not bent around the beads.

Strip-rubber channeling, similar to that used on automobile windshields, may be used. The rubber strip should be either tacked to the wood frame or bedded in hard-setting putty to the frame.

(II) *Metal windows*—The material can be set in a soft nonsetting putty or mastic, preferably one that can be scraped off and reused.

Strip-rubber channeling, as described above for wood windows, may be used.

*b. Adhesive treatments on glass*—Various methods of covering glass with the aim of minimizing the effects of blast lend themselves to effective use. Several methods consist of the use of sheets of material cemented to the glass with an adhesive or a liquid material applied with spray or brush. It should be distinctly understood that these treatments will prevent glass from flying in splinters but cannot be relied upon to prevent breakage. However, these materials will reduce extensive breakage by distant blast effects. In selecting a window treatment to reduce the effect of splintering, the following should be considered:

- (1) Tensile strength or extensibility.
- (2) The material should adhere strongly to the glass.
- (3) Both material and adhesive should retain their properties for a reasonable time under exposure.

The material, applied to the inside of the glass, may be in sheets or in strips; it is desirable to render the glass nonreflecting, especially in the case of roof lights.

The following materials may be considered for use on glass:

(1) *Paper*—Papers that are thick and tough are preferable to thin papers. Papers reinforced with a mesh of cotton, linen, hemp, or other fiber are superior to other types.

It is important that the adhesive should remain tacky and not become brittle after being applied. Suitable adhesives are an ordinary flour paste or paperhangers' paste with 5 percent of glycerin or molasses added, or gum arabic with 5 percent of glycerin added. The material should be applied to the inside of the glass.

(2) *Cardboard*—Where permanent obscuration is permissible an all-over covering of cardboard will be satisfactory. Adhesives may be one of those used for paper but should be stronger and may be applied hot or cold. The cardboard may be wetted before applying the adhesive to the inside of the glass.

(3) *Textile Materials*—Textile materials used as an all-over coating consist of two types: Those which give permanent obscuration and those which admit a certain amount of light. The former may consist of burlap pressed into a bituminous emulsion painted all over the glass. This provides complete obscuration and offers good resistance to splintering. Where the admission of a certain amount of



light is desired, textile materials may be used in strips on the inside of the glass and spaced not more than 6 inches each way. Surgical plaster and insulation tape are examples and the adhesion may be improved if they are pressed on with a warm iron.

An adhesive treatment for plate glass consists of a full coat of varnish brushed on the glass and over the frame. When the varnish has become tacky a sheet of fabric or strong textile netting should be pressed into the varnish so that the whole glass area and frame have been covered. After the material has thoroughly set, a full coat of varnish should be applied. This method will serve to minimize the scattering effect for plate glass  $\frac{3}{16}$  inch or  $\frac{1}{4}$  inch thick. However, the translucency will be considerably lessened.

(4) *Transparent wrapping films*—Materials of this type usually admit a large proportion of light but are not generally as resistant to splintering as the textile materials when the latter are properly applied. Some transparent fillers, however, are reinforced with fabric mesh which improves their strength. There are three principal types of this material which are obtainable:

(a) Cellulose nitrate film, known as "celluloid," which is reasonably strong, but is not recommended due to its inflammable properties.

(b) Cellulose film, consisting of two types, *coated* or moisture proof, which should not be used, and *uncoated*. The uncoated is satisfactory and can be detected by moistening when it curls and softens slightly. It burns like newspaper when set on fire. Suitable adhesives are clear gum with 15 percent of glycerin added, and gelatin or gum arabic dissolved in hot water with 15 percent of glycerin added. The adhesive should be applied to the glass and the dry film applied, preferably with a roller. Some cellulose film may be obtained with adhesive applied and needs only to be pressed on.

(c) *Cellulose acetate film*—This material does not take fire and, in burning, melts and drops. Gum is not suitable for application. If an adhesive is not recommended by the manufacturer, a mixture of 9 parts of molasses and 1 of warm water may be used. Unless this film can be obtained in thicker sheets than that generally used for wrapping, several layers should be used. In applying, a roller or straight edge should be used, starting at the top of the pane. Where the glass has been fractured or dislodged, a cellulose acetate film, reinforced with fine wire mesh, will provide a translucent flexible substitute material for glass. The wire mesh should be coated or impregnated with the cellulose acetate. The methods for applying the sheets to the window are the same as those previously described for flexible substitutes for glass. For transparency the use of pure cellulose acetate sheets is recommended. In applying these to a window it will be necessary, first, to attach firmly strips of the same material, the widths of which will depend upon the size of the sheet to be used, on the inside face of the frame around the edge of the opening. The sheets then should be laid over the opening and held in place on the strips by a suitable adhesive as mentioned above.

(5) *Adhesives*—An important requirement of adhesives is that



they should not dry out and become brittle; the addition of glycerin will prevent this. Glass should be thoroughly cleaned before the application of adhesives and special care should be taken to remove all grease. Of the flexible glues, a suitable type for hot application is "bookbinders' glue." Of the pastes, the ordinary paperhangers' paste with 5 percent glycerin or molasses added is the most suitable. Sodium silicate ("water glass") should not be used as an adhesive, as it is liable to damage the surface of the glass.

In general, some additional resistance to splintering can be obtained by coating the outside as well as the inside of the glass.

In the case of roof lights, the material may be applied to the outside. Burlap applied with a bituminous emulsion resists weathering and is effective for such use.

(6) *Liquid Coatings*—Many varieties of compositions are available for window coatings, some of which are transparent and others of which have colored pigment to give obscuration. Flexible glue (mentioned above) may be used as an all-over coating. This material should be heated until fluid enough to be applied with a brush. Two or three coats will provide good resistance to splintering. The glue film may be readily removed with hot water, and is therefore not suitable for use in moist atmospheres of intense heat.

Many compositions include rubber as an ingredient and these may be brushed or sprayed on glass. This material should be applied quickly. Only those compositions containing vulcanizing ingredients are likely to have durable qualities.

It is impossible to predict the probably effective life of these coatings under various conditions. When evidence of deterioration occurs the old coating should be removed immediately and replaced.

In applying liquid coatings, care should be taken that they be put on smoothly, avoiding vertical or horizontal brush lines where some degree of transparency is desired to be retained. Some compositions, unless put on flatly in the first instance, may not smooth themselves out in the ordinary spreading and drying process.

c. *Additional Protection*—All glass should be further protected by chicken-wire mesh not larger than  $\frac{1}{2}$  inch to prevent flying splinters. The mesh should be installed as close as possible to the inside surface of the glass. If attached to the window frame the wire will prevent cleaning or reapplication of the treatments outlined above. The netting is therefore best attached to a separate frame fitted snugly in against the window. A curtain or screen may then be attached to the opposite side of the frame, and will offer reasonable protection from weather if the glass is destroyed. Another method of preventing flying splinters of glass is to attach battens against the inside surface of the glass at about 2-foot centers.

d. *Emergency Repairs*—In addition to the initial precautions to guard against damage from glass splinters, preparation should be made to provide and have near at hand materials for the immediate repair of glass or its substitutes in the event of breakage. The foregoing methods do not prevent breakage but lessen the chance of severe

damage from fragments. In all cases, irrespective of precautions taken, a certain amount of risk must be accepted. The most elaborate methods will fall sufficiently short of expectation at times so that immediate and rapid repairs will be necessary in order to maintain occupancy and production. The results of having a false sense of security because of a few prescribed safety measures are obvious when one realizes the potential powers of high explosives.

In the case of roof glazing, suitable materials for temporary or permanent repair are tarpaulins, bituminous sheeting (to be laid over glazing bars and attached with suitable clips), asbestos-cement sheet, timber, and corrugated sheet steel. If glass is replaced it should be of the wired type, and should be supported underneath by large mesh wire netting or by transverse supports as previously described herein.

These materials may also be used for vertical glazing with the addition of translucent materials such as cellulose-acetate sheet reinforced with wire or fabric mesh, or textiles, oiled or waxed. Where glass is replaced it should be of the wired type.

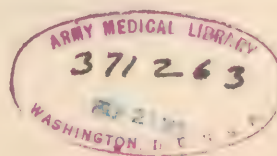
It must be borne in mind, when providing protection for stocks of repair materials, that asbestos-cement sheeting is vulnerable to blast and fragments on roofs and subject to fracture. However, in vertical surfaces it is much more resistant to blast than is glass in typical factory windows.

**5. Obscuration—*a. General***—The problems of obscuration are discussed more fully in *Blackouts*, recently issued by the United States Office of Civilian Defense, Washington, D. C. A few suggestions are given briefly below:

In maintaining blackout requirements some means of completely preventing light or reflections from being projected through openings must be provided. Several of the foregoing treatments described for the protection of glass may also serve the purpose of maintaining the blackout requirements. Opaque materials applied in the protection of glass are satisfactory where the material retains its opaque qualities for a reasonable time; however, this method may not give access to sufficient natural light during daylight hours, particularly during inclement weather when windows will be kept closed.

A satisfactory method of obscuring light is achieved by providing screens of any dark fairly heavy material which will exclude light. These should be made full so that the edges will have sufficient overlap on the walls and should have a strip or some means of attaching the screen at the bottom. Such screens are easy to make and will provide complete obscuration if the sides and bottoms are snugly fastened.

A screen may be built of frame strips 1 inch by 2 inches and plywood or heavy cardboard or even a heavy textile material may be applied. The edge of the frame may be lined with felt, rubber, or other material and made to fit snugly in the window (figure 9). This will give protection against gas where a tight fit is obtained. Rubber bands should be fastened to the top of the frame and the window lintel so that if the frame should be displaced it will be suspended and may readily be put back.





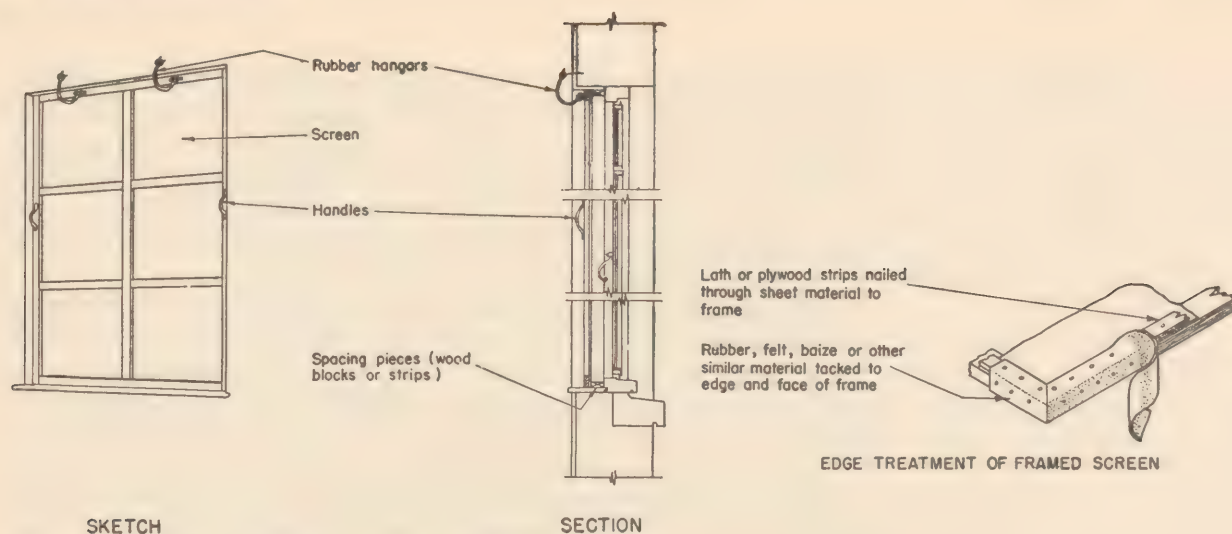


FIG. 9—TYPICAL INTERNAL LIGHT WEIGHT SCREEN

An alternate to this frame would be one containing a ventilator which would prevent light from being reflected from inside. A number of methods of ventilation may be used according to the adaptability of the individual requirements.

Obscuration may be obtained by painting the glass. This method will render glass useless for admitting daylight unless the window can be opened. A dark paint of considerable body, which will not be too difficult to remove and will not damage the glass, will be suitable. One or more coats may be applied as required.

**b. Industrial Plants**—When continuous production is required in vital industrial plants and a sufficient amount of daylight must be maintained, thereby limiting the percentage of the total glass area that may be permanently obscured, effective measures of blackout will be necessary in addition to protection from glass breakage. Should a considerable portion of the roof area consists of skylights, the glazing on alternate panels may be removed and replaced by plywood or composition panels properly treated for resistance to weather. The glass removed may be stored for future use. The remaining glass may be treated in one of the methods previously described. Shutters capable of being opened and closed should be provided where the glass is exposed and should be fitted to protect against weather. There are a number of methods of installing shutters and group-control apparatus should be provided for prompt operation.

Where the obscuration has been damaged beyond immediate repair, it is evident that delays in plant operation will occur, and such interruptions may become serious. For this reason the maintenance of blackout after damage has been wrought is an extremely important feature.

**6. Ventilation**—Ventilation offers an immediate problem during warm weather where blackout precautions must be observed. A number of satisfactory methods may be adapted to the individual schemes of normal ventilation and are discussed in *Blackouts*, to which reference is made above. During daylight hours ventilation may be provided by the usual methods.

### ***C. Conclusions and Recommendations***

In the selection of the types of protection, consideration should be given to the following:

- a.* Degree of occupancy
- b.* Importance of material or equipment to be protected
- c.* Method most efficient and best adapted to conditions
- d.* Economy
- e.* Time

In all cases adequate protection for personnel should be provided.

Based on practical experience gained in actual air raids, and from tests conducted abroad, it may be stated that there is no sure way to prevent the breakage of glass. Perhaps the best method is to remove the glass and replace it with a suitable substitute or to block the window opening entirely. However, of the several treatments for the protection of glass discussed herein, some have proved to be more resistant than others, and are as follows:

- a.* Burlap bituminous treatment
- b.* Wire mesh and screens
- c.* Wired glass
- d.* Controllable shutters



## BIBLIOGRAPHY

It is believed that the following selected list of publications will meet general needs for information on the protection of glass and glass substitutes.

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# REPORT OF BOMB TESTS ON MATERIALS AND STRUCTURES

*Memorandum on Protective Construction*



*United States Office of Civilian Defense  
Washington, D. C.*

PREPARED BY THE WAR DEPARTMENT  
PREPARED UNDER THE DIRECTION OF THE CHIEF OF ENGINEERS, U. S. ARMY



# FOREWORD

This is one of a series of Protective Construction Pamphlets treating protection against the effects of aerial bombs, which are being prepared by the Office of the Chief of Engineers of the War Department and by the Office of Civilian Defense.

Publications dealing with protective construction, recently prepared by the War Department, include:

Protective Construction, Structure Series, Bulletin No. 1, prepared by the War Department with the assistance and advice of other Federal agencies and issued by the Division of State and Local Cooperation, Office for Emergency Management, Washington, D. C.

Glass and Glass Substitutes, Protective Construction Series, Bulletin No. 1, prepared under the direction of the Office of the Chief of Engineers, U. S. Army, and issued by the Office of Civilian Defense.

The following is a tentative list of subjects which will be treated in subsequent pamphlets though not necessarily in the order named:

- Air-raid shelters in buildings
- Communal air-raid shelters
- Bomb-resistant shelters
- Small domestic air-raid shelters
- Measures of defense against incendiary bombs
- Structural design of factories involved in National defense

In addition to the above, it seems highly desirable to issue at a later date pamphlets giving more complete information which may be of use to engineers concerned with major design problems of protective construction. These will be as follows:

- Aerial bombs
- Penetration of bombs
- Blast
- Bomb fragments

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# INTRODUCTION

In December 1938, the War Department directed the Chief of Engineers, U. S. Army, to study structural protection against aerial bombs with a view to facilitating the preparation of instruction on the subject when needed. It became apparent that protection of the civil population might be a very expensive proposition and that money could be well spent in developing types of air-raid shelters which would furnish protection at minimum cost, and in conducting tests of other protective construction features.

Plans for shelters to give protection against splinters and those to protect against direct hits were prepared. Considerable dependence was placed on information secured abroad on the assumption that a much more intensive study of the problem had been made there than in the United States. It was not possible, however, to obtain specific information which was needed and it was considered necessary to find out by test just what the effects of bombs were and more particularly whether the structures that had been designed were adequate for the purpose.

According to a tentative program it was arranged that the Chief of Ordnance would furnish the bombs and conduct the tests in accordance with the agreed program; the Chief, Chemical Warfare Service, would furnish equipment for gas removal; and the Chief of Engineers would build all structures and record all test data.

Funds were made available July 1, 1940. A site on Gunpowder Neck, Aberdeen Proving Ground, Md., was approved and construction was started in September 1940, and completed in January 1941, by the District Engineer, U. S. Engineer Office, Baltimore, Md.

Detailed descriptions of the structures and tests are given in the appropriate sections of the report which follows. However, some of the general considerations are presented here with a view to giving a better understanding of the report.

There were two different types of tests. The first type consisted of controlled tests, made by detonating bombs statically, on the ground or in craters or bored holes in the ground to determine, under predetermined conditions, the effect of splinters and blast, or earth shock at definite distances from the structures under test. The test of panels of building material and protective materials and the tests of seven types of shelters were of this class.

The second type of tests had the primary purpose of determining the adequacy of the structures to resist bombing under actual conditions and required general bombing of structures with different sizes of bombs from various altitudes. All the structures, including the splinter-proof shelters tested by static detonation initially, were placed in a general area approximately 100 by 330 feet. The western end of this area contained the splinterproof shelters and the typical panels of reinforced concrete building construction designated as building prototypes. In this portion, bombing with bombs up to 100 pounds in weight was scheduled. In the eastern end of the area were placed an under-



ground type of shelter, bombproof shelter A, with seven types of burster slabs over it to give protection against direct hits of 500-pound bombs; a two-story British shelter to give the same protection, bombproof shelter B, and several types of pipe and cable buried 5 to 15 feet in the ground.

In order to obtain the effects of impact alone and to determine the penetration without the complication of explosive damage, sand filled bombs were used first. Later, explosive bombs were released to provide a measure of the combined effect of impact and explosion.

In planning the tests a great many questions arose, particularly as to the desirability of taking precise measurements of the pressures exerted by blast, movements of walls with respect to time when subjected to blast pressure, earth movement and earth pressures from underground explosion. Provision was made for measuring earth pressures on top of the underground structure and for rough measurement of blast but it was quite apparent that the general purpose of the tests would be defeated if measurements of the type more adapted to laboratory conditions than field tests were employed. They were, therefore, deferred until better conditions could be provided.

The obvious need for further information which could not be obtained from the initial tests or from British sources clearly indicated that a comprehensive series of tests would be required. Additional full-scale tests have been made for which reports are not yet available and others are contemplated.

In the long-range effort the Office, Chief of Engineers, has been very materially assisted by the Committee on Passive Protection Against Bombing of the National Academy of Sciences, operating under contract which provides for payment of expenses of the outstanding scientists who are contributing to the knowledge of the effects of bombs. This committee is constituted as follows: Dr. Richard C. Tolman, chairman; Dr. Karl Compton, Dean Luther P. Eisenhart, and Dr. F. R. Moulton, members; and Professor John Burchard, executive officer.

The need for scientific assistance became apparent in the attempt to design adequate structures to resist the effects of aerial bombs within reasonably close limits. It was realized that the problem was a dynamic one, involving actions quite different from those encountered in ordinary structural engineering. One very important point was that there need be no concern about stress beyond the elastic limit as long as a structure continued to afford protection. Design criteria for stresses beyond the elastic limit are not generally available.

The committee has been operating since July 1, 1940. Professors H. P. Robertson and Walker Bleakney, with the assistance of Professor Roy W. Carlson, have carried on numerous small-scale tests of various kinds of concrete and other materials to determine their resistance to penetration and to establish general laws governing the penetration phenomenon. All available literature was reviewed and information on results of tests by the Army and Navy have been furnished and current tests have been witnessed. Tests of explosive effects on models are now going forward. The advice of and independent study of the committee has been extremely valuable and it is anticipated that future tests will be given direction by its investigations.

# PART I

## BOMBS DETONATED STATICALLY

### *Wall Panels*

#### **Purpose**

The purpose of this test was to determine the relative resistance to splinters and blast effect of bombs on (1) common wall panels and (2) special wall panels designed to resist bombing.

#### **Description**

Eleven panels 5 feet high and 10 feet wide were mounted on vertical wood frames and buttressed with sandbags. The materials and methods of construction were as follows:

*Panel No. 1.*—Wood wall—similar to frame house construction was erected with  $\frac{7}{8}$ -inch sheathing covered by  $1\frac{1}{16}$  by  $9\frac{1}{4}$ -inch weather boarding.

*Panel No. 2.*—Brick veneer wall—of standard construction consisting of  $\frac{7}{8}$  by 8-inch sheathing faced by a wall 4 inches thick of one brick course anchored to the frame by metal ties. The rear surface was  $\frac{3}{4}$ -inch plaster on metal lath similar to plaster wall interiors.

*Panel No. 3.*—12-inch brick wall—similar to solid brick construction with a concrete frame provided for support.

*Panel No. 4.*—Corrugated iron—two equal sections of (a) 10-gage and (b) 12-gage metal attached to wood frame.

*Panel No. 5.*—Corrugated iron—two equal sections of (a) 3-gage and (b) 8-gage metal attached to wood frame.

*Panel No. 6.*—Structural steel— $\frac{1}{2}$ -inch plate, supported by a wood frame.

*Panel No. 7.*—Structural steel—1-inch plate, supported by a wood frame.

*Panel No. 8.*—Sandbag wall—30 inches thick constructed of burlap bags filled with sand.

*Panel No. 9.*—Plywood—2 layers of  $\frac{3}{4}$ -inch boards, erected on a wood frame backed with sandbags about 18 inches high. The panel was divided into two equal sections (a) having 2 layers  $\frac{3}{4}$  inch thick, separated by 2- by 4-inch studs and (b) 2 layers  $\frac{3}{4}$  inch thick nailed together.

*Panel No. 10.*—Asbestos cement—consisting of three equal panels of (a) corrugated asbestos cement  $\frac{3}{8}$  inch thick, (b) flat sheet 1 inch thick, and (c) flat sheet 2 inches thick.

*Panel No. 11.*—Cinder block wall—constructed of hollow cinder concrete blocks forming a wall 8 inches thick within a surrounding frame of 12 by 12 inch timbers.

#### **Procedure**

The panels were arranged equidistant along the circumference of a circle as shown on plate No. I. Test A consisted of detonating statically a 600-pound demolition bomb, M32, in the center of a circle of 50-foot radius. After the results were recorded and photographs

taken, the panels were arranged in a circle of 25-foot radius and test B was made by statically detonating a 300-pound demolition bomb, M31, in the center.

## Results

The results of tests A and B are tabulated on charts shown on plate No. I.

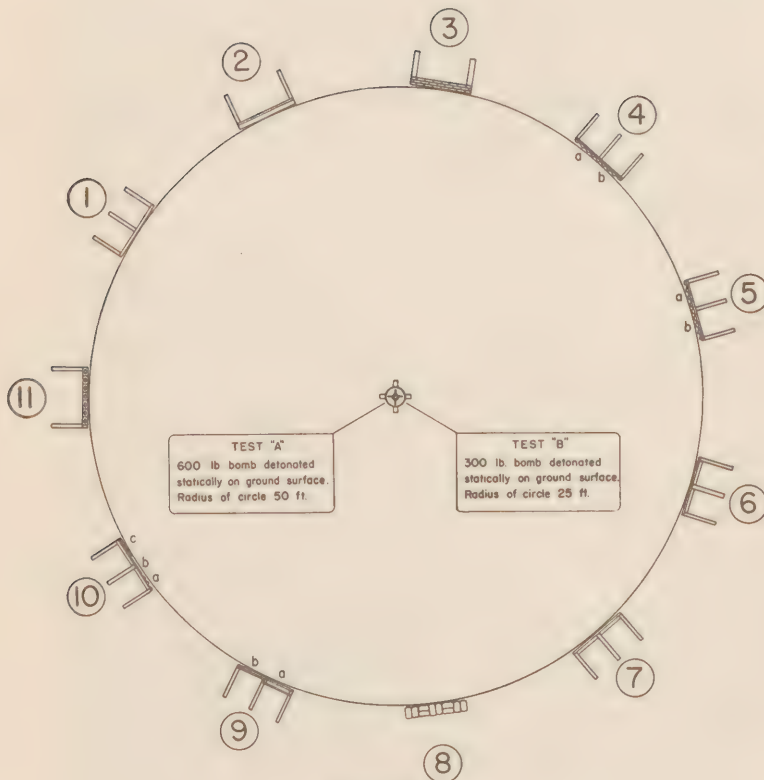


PLATE NO. I.

### RESULTS OF BOMB TESTS ON PANELS

#### BOMB SPECIFICATIONS

(300-pound demolition M31—Charge 50-50 Amatol—Nose fuse M103 (modified).  
(600-pound demolition M32—Charge 50-50 Amatol—Nose fuse M103 (modified).

PANEL TEST "A"				
600 POUND DEMOLITION BOMB DETONATED AT 50 FEET				
Description of Panel	Number of Perforations	Number of Penetrations	Maximum Depth of Penetrations	Remarks
1 WOOD WALL 11" Siding on 1/2" sheathing	15	11	1 1/8"	Panel remained standing
2 BRICK VENEER 4" Brick on 1/2" sheathing	2	23	1 3/4"	Wall was cracked in several places
3 12" BRICK WALL Standard masonry	None	20	2"	Panel damaged very little
4 a CORRUGATED IRON 10 Gage	12	6	1 1/4"	Panel moved slightly by blast and sheets were warped slightly
b CORRUGATED IRON 12 Gage	11	5	1 1/4"	No other damage
a CORRUGATED IRON 3 Gage	3	11	1 1/2"	Panel not otherwise damaged
b CORRUGATED IRON 8 Gage	5	16	3/16"	
6 STRUCTURAL STEEL 1/2" Plate	11	27	9/16"	No other damage
7 STRUCTURAL STEEL 1" Plate	None	11	1"	No other damage
8 SANDBAGS 30" Wall	None	31	5 1/2"	Two courses of end were blown over
a PLYWOOD - 2 LAYERS 3/4" on 2" x 4" studs	9	5	3/4"	Panel remained in place
b PLYWOOD - 2 LAYERS 3/4" nailed together	8	3	1"	Panel dislodged and fell 10 ft. closer to explosion
a ASBESTOS CEMENT 3" Corrugated	—	—	—	Panel completely disintegrated
b ASBESTOS CEMENT 1" Flat sheet	11	3	3/8"	Panel remained in place
c ASBESTOS CEMENT 2" Flat sheet	11	2	3/4"	Panel remained in place
11 CINDER BLOCK 8" Wall - hollow core	11	13	1 1/2"	Panel not otherwise damaged

PANEL TEST "B"				
300 POUND DEMOLITION BOMB DETONATED AT 25 FEET				
Description of Panel	Number of Perforations	Number of Penetrations	Maximum Depth of Penetrations	Remarks
1 WOOD WALL 11" Siding on 1/2" sheathing	—	—	—	Panel blown to bits & scattered about
2 BRICK VENEER 4" Brick on 1/2" sheathing	None in remaining portion	10	1 3/4"	Upper portion was shattered
3 12" BRICK WALL Standard masonry	Large hole in top of panel	15	6"	Previous penetrations enlarged
a CORRUGATED IRON 10 Gage	8	25	3 1/8"	Entire panel was blown about 50 feet
b CORRUGATED IRON 12 Gage	40	60	8"	Sheets were not otherwise damaged materially
c CORRUGATED IRON 3 Gage	23	57	3 1/16"	Panel was blown over - no other damage noted.
d CORRUGATED IRON 8 Gage	22	39	3 1/16"	
6 STRUCTURAL STEEL 1/2" Plate	11	102	7 7/8"	Panel was blown over
7 STRUCTURAL STEEL 1" Plate	11	157	1"	Panel remained standing
8 SANDBAGS 30" Wall	None in remaining wall	11	7 1/2"	Bags blown over except 6 bottom courses
a PLYWOOD - 2 LAYERS 3/4" on 2" x 4" studs	31	9	1 1/8"	Panel blown over but plywood did not shatter
b PLYWOOD - 2 LAYERS 3/4" Nailed together	15	40	3 1/4"	
c ASBESTOS CEMENT 3" Corrugated	—	—	—	Panel destroyed by previous test
d ASBESTOS CEMENT 1" Flat sheet	—	—	—	Panel was shattered partially by blast
e ASBESTOS CEMENT 2" Flat sheet	17	55	7 7/8"	Panel not shattered
11 CINDER BLOCK 8" Wall - hollow core	5	39	2 1/4"	Wall blown over except 2 bottom courses



**Panel No. 2**



Test B—Panel No. 2 after static detonation of 300-pound demolition bomb at 25 feet.

**Panel No. 3**



Test B—Panel No. 3 after static detonation of 300-pound demolition bomb at 25 feet.

**Panel No. 7**



Test B—Panel No. 7 after static detonation of 300-pound demolition bomb at 25 feet.

### **Panel No. 9**



Test B—Panel No. 9 after static detonation of 300-pound demolition bomb at 25 feet.

### **Panel No. 11**



Test B—Panel No. 11 after static detonation of 300-pound demolition bomb at 25 feet.

### **Conclusions**

The ratio of the number of perforations to the sum of perforations and penetrations provides an approximate measure of the splinter resistance of these wall panels. The results of these tests confirm the proof thickness requirements of tested materials for splinter protection as shown in table 4 of Protective Construction Bulletin No. 1. The conclusions as to the resistance of the panels to blast and splinters listed in the approximate order of acceptability are as follows:

*Structural steel plate—1 inch.*—This panel was the most resistant to blast and splinters. Although perforations occurred in test B at 25 feet, none occurred at 50 feet. This suggests that the requirement of  $1\frac{1}{2}$  inches given in table 4 of Protective Construction is conservative.

*Brick wall—twelve inches thick.*—The resistance to splinters was satisfactory. The blast effect caused bond failure particularly at 25 feet.

*Sandbags—30-inch.*—This wall offered good resistance to splinters. The laying of sandbags is an important detail. The bags should be filled not more than one-half to three-fourths full with sand or earth and the opening sewed or fastened by other means. They should be laid flat with the material evenly distributed and the course lapped longitudinally and laterally. Each layer should be thoroughly tamped to form a good bond and to compact the material. A side slope of approximately 4 on 1 should be maintained for stability. An illustration of a suitable sandbag wall is shown in Protective Construction Bulletin No. 1, figure 3.

*Structural steel plate, one-half inch.*—Fair resistance to splinters and blast was evident but additional thickness of steel or other material would be necessary to prevent perforations at 50 feet.

*Cinder block wall, 8 inches thick.*—The blocks offered fair resistance to splinters at 50 feet. Blast and splinters practically demolished this panel at 25 feet. The cores of the blocks could be filled with sand to provide added resistance but such a wall would not be entirely satisfactory at 50 feet without additional thickness and reinforcing. It is probable that similar blocks of concrete filled with sand would provide a greater degree of protection.

*Brick veneer—4-inch brick with sheathing and plaster.*—This panel was not completely resistant to splinter perforation at 50 feet. It was damaged severely by blast and splinters at 25 feet.

*Corrugated iron.*—These panels offered slight resistance to splinters. Little distortion was caused by blast although the panels were blown down.

*Other panels.*—Plywood, asbestos cement sheets, and wood panels were only slightly resistant to blast and splinters at 50 feet. Their tendency to shatter and disintegrate makes their use to resist splinters inadvisable.

## ***Splinterproof Air Raid Shelters***

### ***Purpose***

The purpose of this test was to determine the resistance of several types of shelter to (1) mined explosion from bombs detonating after penetrating earth and (2) blast and splinters from bombs detonating on or near the ground surface.

### ***Description***

The seven shelters tested were constructed in accordance with current practice for splinterproof structures and were of the buried, semiburied, and surface type. The materials and types of construction were as follows:



1. *Buried splinterproof air-raid shelter for six persons.*—Reinforced concrete construction shown on plate No. II. A similar shelter is shown in Protective Construction Bulletin No. 1, figure 5.

2. *Buried splinterproof air-raid shelter for six persons.*—Wood frame construction shown on plate No. III.

3. *Semiburied splinterproof air-raid shelter for 50 persons.*—Corrugated iron construction shown on plate No. IV. A similar shelter for six persons is shown in Protective Construction Bulletin No. 1, figure 6.

4. *Semiburied splinterproof air-raid shelter for six persons.*—Corrugated iron arch construction shown on plate No. V. A similar shelter is shown in Protective Construction Bulletin No. 1, figure 7.

5. *Semiburied splinterproof air-raid shelter for six persons.*—Corrugated iron arch and wood construction shown on plate No. VI.

6. *Semiburied splinterproof air-raid shelter for six persons.*—Corrugated iron and concrete construction shown on plate No. VII. A similar shelter is shown in Protective Construction Bulletin No. 1, figure 8.

7. *Surface splinterproof air-raid shelter for six persons.*—Reinforced concrete construction shown on plate No. VIII.

In establishing the basis of design of these shelters splinter protection was in accordance with the requirements shown in table 4 of Protective Construction Bulletin No. 1. Design for blast was arbitrary. Concrete design was in accordance with the 1936 American Concrete Institute Code.

For the concrete structures, surface walls and their protective coverings were made adequate in thicknesses to resist splinters and balanced reinforcing was used to develop the full strength of the concrete.

Roof and walls were designed for dead load plus a debris load of 350 pounds per square foot with 100 percent impact. The floor slabs were designed for total dead load, plus live load, plus 100 percent impact for roof live load.

The recommendations of manufacturers were followed in the design of corrugated iron structures.

The compressive strengths of concrete test cylinders for the concrete shelters are shown in table No. 1.

## **Procedure**

Demolition bombs weighing 300 and 600 pounds were placed in the manner shown on the drawings for the various shelters and detonated statically in the numerical order indicated. Effects were observed and recorded after each detonation. Bombs detonated on the surface exposed the shelters to blast and splinters. Bombs detonated in back-filled holes or in open craters exposed the shelters to underground explosion and reduced blast.

During later tests with explosive bombs released from aircraft, two 100-pound bombs fell near shelter No. 6 and two 600-pound bombs fell near shelter No. 7. The effects of these bombs are included on plates Nos. VII and VIII.

## Results

The results of each bomb detonation are described in detail on the plates showing plans of the shelters, Nos. II to VIII, inclusive.

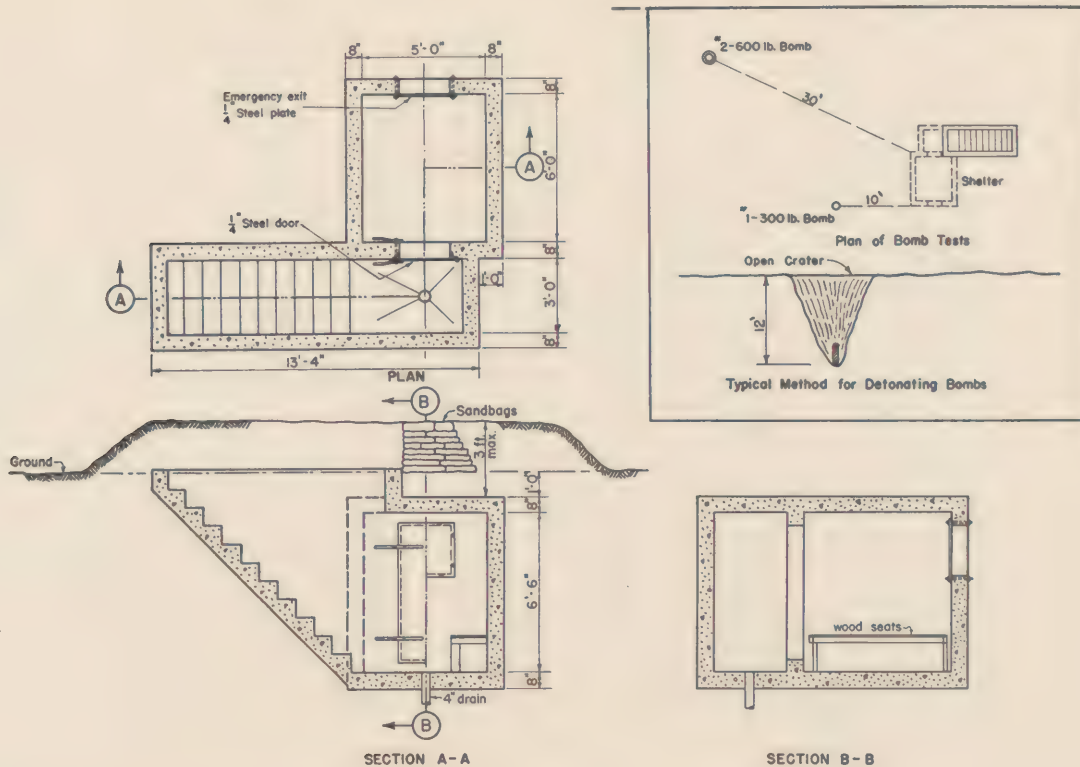


PLATE NO. II.

BOMB TESTS ON BURIED SPLINTERPROOF AIR-RAID SHELTER FOR SIX PERSONS.

### RESULTS OF BOMB TESTS (MINED EXPLOSION).

*Bomb No. 1. 300-pound demolition bomb detonating statically 10 feet from shelter.*

Effects: (A) Numerous hairline cracks appeared in the roof, walls, and floor. (B) The wall nearest the explosion had a face spall 4 feet long and 5 inches wide at base with 1/16-inch crack extending toward roof. (C) Two emergency exit cover plate bolts sheared off and left edge of plate pushed in 1 1/2 inches. (D) Both door keepers were sheared off and door panel on hinge side was pushed in 3/16 of an inch. (E) No change in interior dimensions was noted.

*Bomb No. 2. 600-pound demolition bomb detonated statically 30 feet from shelter.*

Effects: (F) No additional damage occurred to shelter.

Remarks: The above tests were conducted with the door mounted on the inside of entrance. Tests proved the advisability of mounting door on the outside.

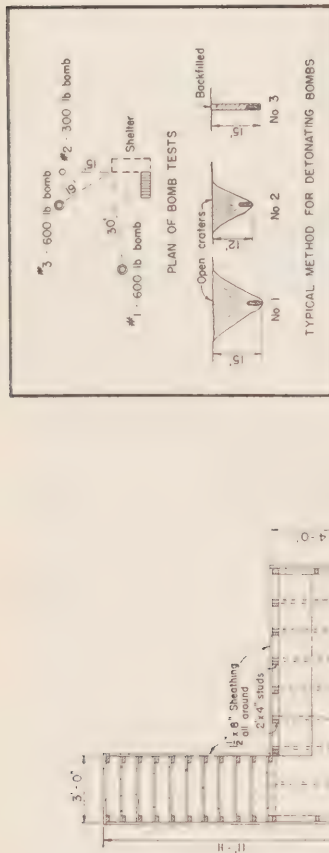


PLATE NO. III.

### BOMB TESTS ON BURIED SPLINTERPROOF AIR-RAID SHELTER FOR SIX PERSONS

#### RESULTS OF BOMB TESTS (MINED EXPLOSION).

*Bomb No. 1. 600-pound demolition bomb detonated statically 30 feet from shelter.*

Effects: (A) No apparent damage was caused to the inside of shelter. (B) The gasproof curtain was blown off entranceway. (C) A crack one-half-inch wide appeared between earth fill and 8" x 8" timber at top step of shelter entrance.

*Bomb No. 2. 300-pound demolition bomb detonated statically 15 feet from shelter.*

Effects: (D) A 2" x 10" timber stud in the middle of end wall nearest explosion was pulled away 2 inches at top but bottom remained in place. (E) No change was caused in inside shelter dimensions.

*Bomb No. 3. 600-pound demolition bomb detonated statically 10 feet from shelter.*

Effects: (F) The entranceway was partially blocked by earth and broken studs and planks from badly damaged entranceway wall nearest explosion. (G) The shelter wall nearest explosion had all studs and sheathing broken. The adjacent wall had some studs and sheathing broken, and top was pushed into shelter about 2 feet. Flooring was buckled up. (H) About one-half of the material utilized in the shelter was damaged beyond repair. (I) The crater resulting from the detonation had a surface diameter of 35 feet, a bottom diameter of 13 feet, and a depth below natural ground surface of 6 feet.

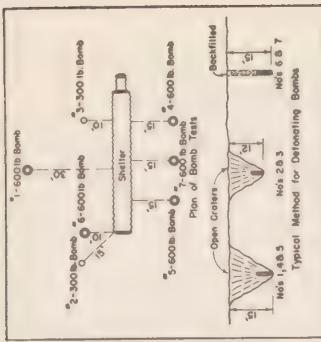


PLATE NO. IV.

(See page 55)

### BOMB TESTS ON SEMIBURIED SPLINTERPROOF AIR-RAID SHELTER FOR 50 PERSONS.

#### RESULTS OF BOMB TESTS (MINED EXPLOSION).

*Bomb No. 1. 600-pound demolition bomb detonated statically at 30 feet from shelter*

Effects: (A) Cracks appeared in top and side of earth cover nearest static detonation. (B) No apparent damage or change in inside shelter dimensions was observed.

*Bomb No. 2. 300-pound demolition bomb detonated statically 15 feet from shelter.*

Effects: (C) No apparent damage or change in inside shelter dimensions was observed.

*Bomb No. 3. 300-pound demolition bomb detonated statically 10 feet from shelter.*

Effects: (D) The door was blown open but not damaged. (E) Additional cracks appeared in the earth cover on top and side nearest static detonation. (F) No apparent damage or change in inside shelter dimensions was observed.

*Bomb No. 4. 600-pound demolition bomb detonated statically 15 feet from shelter.*

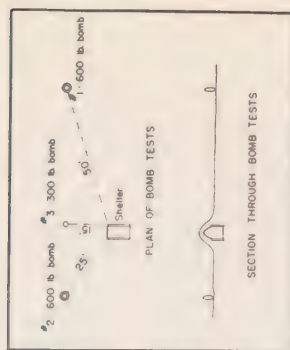
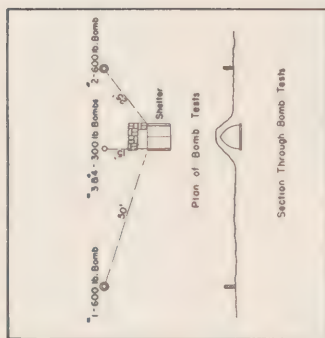
Effects: (G) The door was blown open but not damaged. (H) Additional cracks appeared in the earth cover on top and side nearest static detonation. (I) No apparent damage to inside of shelter and no change in inside shelter dimensions was noted.

*Bomb No. 5. 600-pound demolition bomb detonated statically 15 feet from shelter*

Effects: (J) Additional cracks appeared in the earth cover on the side near static detonation. (K) No apparent damage to inside of shelter and no change in inside shelter dimensions was noted.

(Continued on page 55)

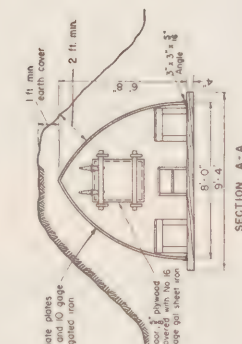
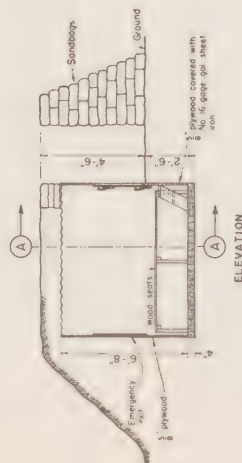




Note: Door was installed inside shelter during tests.

PLAN

SECTION THROUGH BOMB TESTS



ELEVATION

SECTION A-A

PLATE NO. V.

## BOMB TESTS ON SEMIBURIED, SPLINTERPROOF, AIR-RAID SHELTER FOR SIX PERSONS.

### RESULTS OF BOMB TESTS (BLAST AND SPLINTERS).

**Bomb No. 1.** 600-pound demolition bomb detonated statically 50 feet from shelter.  
Effects: (A) Explosion blew the door into the shelter and cracked the rear plywood wall, the door frame being badly splintered and cracked. The plywood front above the door was cracked. (B) Two splinters perforated the front wall and one continued on with force sufficient to perforate the corrugated iron roof. (C) Splinters penetrated the earth cover and sand bags in many places and two sandbags were blown into entranceway.

**Bomb No. 2.** 600-pound demolition bomb detonated statically 25 feet from shelter.  
Effects: (D) Explosion blew the door into shelter, but no additional damage was caused to inside of shelter. (E) Only one splinter was recovered, which penetrated the earth cover. No penetrations were observed in the shelter.

**Bomb No. 3.** 300-pound demolition bomb detonated statically 15 feet from shelter.  
Effects: (F) No additional damage was caused to the inside of shelter and no penetration of splinters could be found.

Remarks: During tests with bombs Nos. 1 to 3, the entrance door was fastened by a latch. After an emergency entrance was installed, two 2" x 4" braces held in place by steel brackets were installed against the inside face of door as shown above, after which the following test was made.

**Bomb No. 4.** 300-pound demolition bomb detonated statically 15 feet from shelter.  
Effects: (G) All the steel door brackets were bent. The bottom 2" x 4" brace was broken in two pieces and the top 2" x 4" had the end broken off. Both braces were found lying on the floor of shelter. (H) The door was torn from its fastenings and hurled against rear wall, making a perforation 5" x 2". (I) Sandbags were blown into entranceway, completely closing it and five sandbags were found on the floor of the shelter. (J) The entire front of the shelter was severely damaged, although no penetration by splinters was observed.

PLATE NO. VI.

## BOMB TESTS ON SEMIBURIED, SPLINTERPROOF, AIR-RAID SHELTER FOR SIX PERSONS.

### RESULTS OF BOMB TESTS (BLAST AND SPLINTERS).

**Bomb No. 1.** 600-pound demolition bomb detonated statically 50 feet from shelter.

Effects: (A) The door was perforated in the center and blown into the shelter, the door frame being badly splintered and sections of the front wall loosened. (B) The perforation in the door was the only one observed and no other damage was caused to the inside of shelter.

**Bomb No. 2.** 600-pound demolition bomb detonated statically 25 feet from shelter.  
Effects: (C) Three sandbags were blown into entranceway. (D) The front wall to the left of doorway was broken off and found laying inside the shelter. (E) Sandbags were torn and surface of earth cover at rear of shelter was cracked and scattered by blast.

**Bomb No. 3.** 300-pound demolition bomb detonated statically 15 feet from shelter.  
Effects: (F) Sandbags were blown into the entranceway, completely closing the exit to the shelter. (G) The front of the shelter was open and five sandbags were found on the floor inside. (H) No perforations were found in the shelter and no other damage was caused inside.

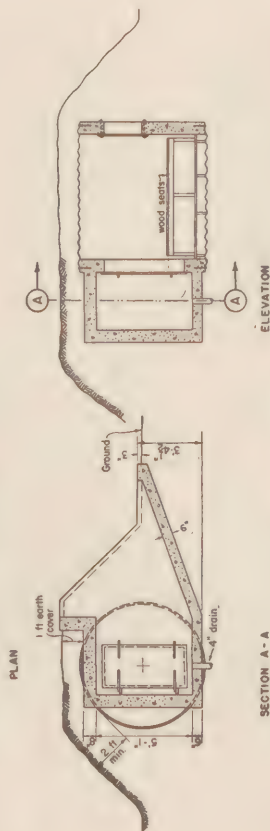


PLATE NO. VII.

(See page 55)

### BOMB TESTS ON SURFACE SPLINTERPROOF AIR-RAID SHELTER FOR SIX PERSONS RESULTS OF BOMB TESTS (BLAST AND SPLINTERS).

*Bomb No. 1. 600-pound demolition bomb detonated statically 50 feet from shelter.*

Effects: (A) The door was fastened with top keeper only, which was sheared off by blast and the door was found open. (B) No other damage was caused to the inside of the shelter and no perforations or penetrations of the corrugated iron occurred.

*Bomb No. 2. 600-pound demolition bomb detonated statically 25 feet from shelter.*

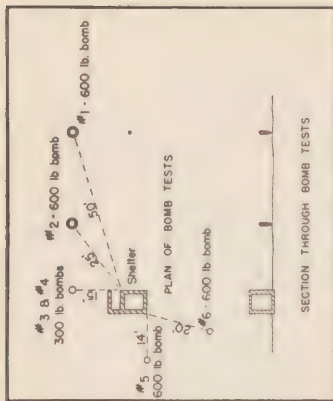
Effects: (C) Numerous cracks appeared in earth cover on the side near explosion. (D) The door had been left open 2 or 3 inches and was found in the same position after the explosion. (E) No additional damage was caused to the inside of shelter and no penetrations could be found.

*Bomb No. 3. 300-pound demolition bomb detonated statically 15 feet from shelter.*

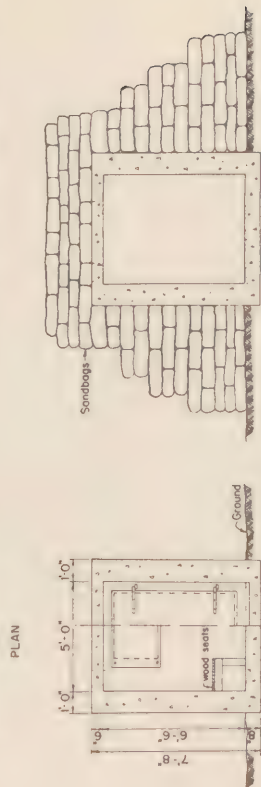
Effects: (F) Numerous cracks appeared in earth cover and a layer of earth about 4 inches thick was blown from the side nearest explosion. (G) The door was left open 2 or 3 inches but no damage resulted therefrom.

Remarks: After the above tests were completed the door was removed from the inside and fastened on the outside, which indicated a more satisfactory installation as shown above after which the following test was conducted.

(Continued on page 55)



Note: Door was installed inside shelter during tests with exception of Bomb #4.



Method for providing additional protection

SECTION

PLATE NO. VIII.

(See page 55)

### BOMB TESTS ON SEMIBURIED SPLINTERPROOF AIR-RAID SHELTER FOR SIX PERSONS.

RESULTS OF BOMB TESTS (BLAST AND SPLINTERS).

*Bomb No. 1. 600-pound demolition bomb detonated statically 50 feet from shelter.*

Effects: (A) Both doorkeepers were strengthened and door was found open. (B) The steel door frame on hinge side was pushed in 1 1/2 inches (frame was not anchored). (C) Spalls were broken from concrete front wall and entranceway by bomb splinters.

*Bomb No. 2. 600-pound demolition bomb detonated statically 25 feet from shelter.*

Effects: (D) Door had been left open 2 or 3 inches and blast broke door frame at corners and hurled door against the emergency exit cover plate, which was bent by the impact. (E) Numerous spalls were broken from front and side walls by bomb splinters, the maximum penetration being 4 3/4 inches.

*Bomb No. 3. 300-pound demolition bomb detonated statically 15 feet from shelter.*

Effects: (F) The door and frame were removed from shelter in previous test and no damage was caused inside of shelter. (G) Side wall nearest explosion was badly damaged and the end of entrance protection wall was destroyed, probably by blast. (H) Numerous spalls were broken from front wall and entranceway.

(Continued on page 55)

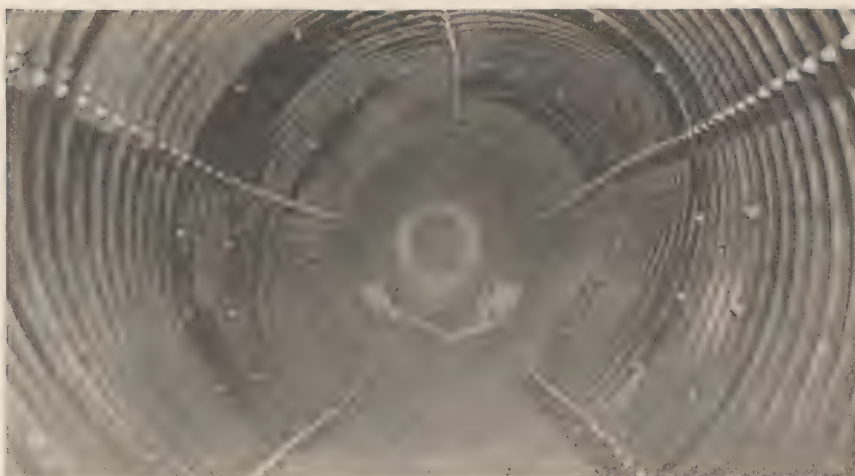


### ***Shelter 2***



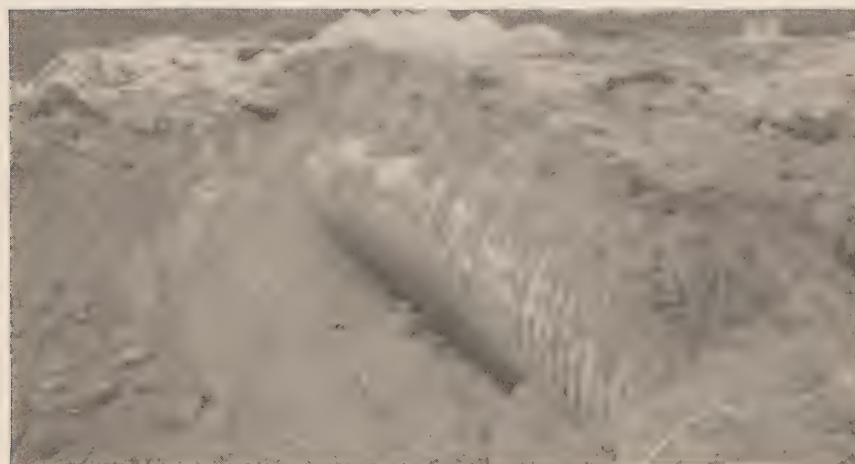
Interior of buried wood shelter (No. 2) after static detonation of 600-pound demolition bomb.

### ***Shelter 3***



Interior of corrugated iron shelter (No. 3) for 50 persons after completion of static detonation bomb tests.

### ***Shelter 3***



Corrugated iron shelter (No. 3) for 50 persons after completion of static detonation bomb tests.



### ***Shelter 6***



View showing corrugated iron and concrete shelter (No. 6) before tests.

### ***Shelter 7***



View of concrete surface shelter (No. 7) after completion of statically detonated bomb tests.

### ***Conclusions***

1. Buried splinterproof air-raid shelter for six persons: (Concrete) plate No. II.

This shelter provided good resistance to bombs detonated in earth and is considered a satisfactory type.

2. Buried splinterproof air-raid shelter for six persons: (Wood) plate No. III.

This shelter offered little resistance to bombs detonated in the earth. The materials were shattered and the structure partially collapsed. The construction of such shelters would only be justified where either time or materials precluded construction of better types.

3. Semiburied splinterproof air-raid shelter for 50 persons: (Corrugated iron) plate No. IV.

The shelter proved to be very resistant. The adaptability to prefabrication and the flexible and simple installation are characteristics which appear to make corrugated iron an excellent material for small shelters.

4. Semiburied splinterproof air-raid shelter for six persons: (Corrugated iron arch) plate No. V.

The shelter was not entirely effective since the plywood end walls were not satisfactory. The corrugated iron arch exhibited good resistance to the effects of the detonated bombs. The conclusion is that the end walls should be replaced by stronger material, i. e., mild steel, and that the sandbag baffle wall should be so constructed as to prevent fragments from striking the end wall of the shelter.

5. Semiburied splinterproof air-raid shelter for 6 persons: (Corrugated iron arch and wood) plate No. VI.

The laminated end walls of plywood and flat galvanized sheet iron were unsatisfactory and should either be reinforced or replaced by a more suitable material, i. e., mild steel. The corrugated iron arch indicated good resistance.

6. Semiburied splinterproof air-raid shelter for six persons: (Corrugated iron and concrete) plate No. VII.

This shelter proved to be one of the most satisfactory of the types tested. Bombs released from airplanes and detonating in the earth nearby demonstrated the resistance of this shelter to underground explosion.

7. Surface splinterproof air-raid shelter for six persons: (Reinforced concrete) plate No. VIII.

This test indicated that serious structural damage resulting from the spalling of concrete and exposure of reinforcing steel may be expected for exposed surface shelters. Additional protection may be provided as shown on plate No. VIII.

In general it has been concluded that the effects of near misses were not as serious as anticipated. It is believed that the shelters, with the exception of the buried wood shelter No. 2, and with the recommended modifications, will provide protection from the effects of 600-pound demolition bombs exploding not closer than 25 feet, including the effects of blast, splinters, and earth shock.

# PART II

## BOMBS RELEASED FROM AIRCRAFT

### ***Concrete Structures and Utilities***

#### ***Purpose***

The purpose of these tests was to determine the adequacy of structures under actual bombing and to determine the effects of (1) Impact and (2) Impact and Explosion on concrete structures and underground utilities.

#### ***Description***

The types of structures erected were three typical reinforced concrete buildings with different types of roof reinforcement, a two-story semiburied bombproof structure (British Design) in three sections of varying roof and wall thicknesses, and an underground shelter beneath a protective earth layer covered by a number of burster slabs of different types.

Standard test cylinders were made to determine the compressive strength of the concrete. The results on compressive tests are given in table No. 1.

The descriptions of the test structures used are as follows:

1. *Building prototypes*.—Construction details appear on plate No. X. The buildings were designated as sections A, B, and C with roof slabs of 5, 12, and 8 inches, respectively. Each section consisted of a roof, supporting columns, beams and footings of reinforced concrete. The height of the structure was 15 feet from top of roof slab to bottom of footing. No floor was provided at ground level.

As a result of the previous static detonation bombs, severe splinter damage was inflicted on several columns and beams of section C, Building Prototypes. It was necessary to reinforce the columns with heavy timbers prior to the general bombing. The damage and the repairs can be seen in the photograph of the concrete surface shelter No. 7, page 12.

2. *Bombproof shelter B*.—This shelter is described in complete detail on plate No. XI and the exposed portion is shown on plate No. X. A similar shelter is shown in Protective Construction Bulletin No. 1, figure 11.

The structure was divided into sections A, B, and C. Section A consisted of a roof 5 feet thick, side walls 3 feet 3 inches thick above ground and 5 feet 6 inches thick below ground, and an underground floor slab 5 feet thick. Sections B and C roof slabs were 3 feet 6 inches and 2 feet thick, respectively, with proportionately thinner walls and underground floor slabs.

The roofs were designed as rigid frames. The upper 2 feet in the case of the 5-foot roof was considered as a protective layer which might be destroyed and the design depth assumed as 3 feet. Balanced



reinforcing was then used and several layers of reinforcing steel were placed near the surface to reduce the disruptive effects of the bombs. Walls were designed for the maximum load which could be supported by the roof. Sections B and C were designed in a similar manner.

A gasproof door was protected by a baffle wall. In practice at least two entrances would be provided.

3. *Bombproof shelter A.*—The plan and details are on plate No. XII and a similar shelter is shown in Protective Construction Bulletin No. 1, figure 10.

This shelter was constructed entirely underground with a 14-foot layer of earth between the roof and the protective burster slabs. Because of the general belief that an air space would provide a good method of reducing the transfer of explosive effects, six layers of 12-inch tile were placed over part of the shelter immediately under the burster slab. One ramp entrance was provided. In practice at least two would be required.

The design of the shelter was based on resistance against a 300-pound demolition bomb according to practice outlined in British publications. The total kinetic energy of the bomb was divided by the expected penetration in the burster slabs to find the force applied. This was then assumed to be uniformly distributed within a cone of pressure from the point of impact to the roof of the structure, and amounted to 2,000 pounds per square foot.

In accordance with British recommendations, no provision was made for explosive effect. This appeared to be an extremely conservative method since it takes no account of the masses to be accelerated and energy lost in deflecting the slab, compressing the soil, etc., and the structure was considered adequate to resist the effects of a direct hit of a 500-pound demolition bomb.

4. *Burster slabs.*—The lay-out and construction details of the burster slabs are shown on plate No. IX. Seven types were used, six being of reinforced concrete 1, 2, and 3 feet thick, embodying several schemes of reinforcement, and a 4-foot sheet asphalt slab.

5. *Utilities.*—Four trenches were excavated in the general bombing area, the depth at one end being 5 feet and the opposite end 15 feet, the length being sufficient to permit 100 feet of each type of installation to be tested.

The following types of utilities were installed in the trenches as shown on plate No. XIII and trenches were backfilled:

- (1) Cast-iron pipe, 4-inch diameter (trench No. 2).
- (2) Steel pipe, 4-inch diameter (trench No. 4).
- (3) Vitrified tile pipe, 8-inch diameter (trench No. 1).
- (4) Concrete pipe, 8-inch diameter (trench No. 3).
- (5) Parkway cable, No. 8, twin conductor, solid,  $\frac{1}{16}$ -inch lead, two steel tapes 0.020-inch, flat wrapping (trench No. 4).
- (6) Loxsteel cable, No. 8, two conductor, solid,  $\frac{1}{16}$ -inch lead, 0.020-inch Loxsteel tape (trench No. 2).
- (7) Standard R. L. A. cable, No. 8, twin conductor, solid, lead, rubber (trench No. 4).
- (8) Telephone cable, 51-pair, 26-gage, lead-covered pulp included (trench No. 2).

Prior to the general bombing all utilities were checked. It was determined that the statically detonated bombs from previous tests had caused considerable damage to the pipes. Neither the concrete, cast iron, nor vitrified tile pipe held water, but the steel pipe showed little leakage. The cables were tested and found to be in good condition.

It will be noted that further results are reported only for the utilities which were intact after this check.

## Procedure

Standard demolition, sandfilled bombs of 100, 300, and 500 pounds were released on the general area by aircraft at altitudes varying from 4,000 to 12,000 feet. The effects were observed for each hit.

Tests with explosive bombs were then conducted. Thirty-pound fragmentation bombs and 100-, 300-, and 600-pound demolition bombs with instantaneous and delay action fuses were released by aircraft at altitudes varying from 5,000 to 12,000 feet.

## Results

**Sand-filled bombs.**—The results of the sand-filled bomb tests on the burster slabs are shown on plate No. IX and on the building prototypes and bombproof shelter B on plate No. X.

**Explosive bombs.**—The results of the live-bomb tests are described on the following data sheets for each bomb hit, together with appropriate photographic references. The subsidences of the structures are given in table Nos. 2 to 5, inclusive. The location of direct hits and near misses on the concrete structures is shown on plate No. XV. The location of hits on utilities is shown on plate No. XIII.

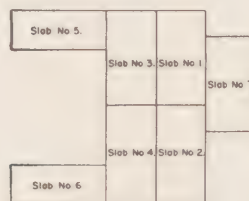
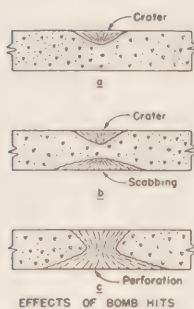
Burst Slab No.	Bomb		Bomber		Crater		Scabbing		Type of Fracture	Effects on Reinforcing	Cracks
	Hit Number	Weight lbs.	Altitude	Ground Speed	Diam. Inches	Depth Inches	Diam. Inches	Depth Inches			
1	11	100	4870	119	20.5	4.75	—	—	Clean fracture of concrete Aggregate also fractured	Did not penetrate to reinforcing	None
	12	500	7830	111	39.0	6.50	—	—	do	do	None visible - Evidence of slab being cracked through
2	21	100	5020	120	24.5	5.50	—	—	do	do	None
	22	100	7650	121	20.0	5.00	—	—	do	do	None
	23	100	7650	121	22.0	5.50	—	—	do	do	None
	24	300	7800	150	37.0	8.75	—	—	do	Sheared top layer of expanded metal	None
	25	300	4880	135	29" on edge 16" into slab	22" on side of slab	40" along slab	—	Irregular fracture in side of slab	Sheared top layer expanded metal - 4" cover on reforc'g	None on top of slab
3	31	100	7650	121	27.0	7.0	—	—	Fairly clean fracture of conc. Some aggr. not fractured	Did not penetrate to reinforcing	None
	32	300	7800	150	32.0	7.5	—	—	Clean fracture of concrete Aggregate also fractured	Sheared top layer expanded metal - 5" cover on reforc'g	One hairline crack from crater to N. edge slab - 40' lg.
	33	300	7900	130	33.0	9.75	—	—	Uneven fracture of concrete	Sheared top layer expanded metal - 4" cover on reforc'g	One hairline crack from crater to S. edge slab - 6' long
	34	500	4930	137	40.0	10.75	—	—	Fairly clean fracture of conc. Some aggr. not fractured	Sheared 2 layers expanded metal - 6" cover on reforc'g	None visible - evidence of slab being cracked through
4	41	300	7900	130	34.0	8.50	—	—	Clean fracture of concrete Aggregate also fractured	Sheared top layer welded wire - 6" cover on reforc'g	None
	42	500	11,970	132	46.0	9.00	—	—	Fairly clean fracture of conc. Aggr. also fractured	Sheared top layer welded wire - 7" cover on reforc'g	6 cracks in W. direction from crater - 1.5 to 5 ft
5	51	100	5020	120	23.0	5.50	—	—	Clean fracture of concrete Aggregate also fractured	Did not penetrate to reinforcing	None
	52	100	7650	121	22.0	4.0	—	—	do	do	do
	53	100	7650	121	21.0	5.0	—	—	do	do	do
	54	100	4900	126	22.0	5.0	—	—	Irregular fracture of concr. Some aggr. not fractured	None - reinforcing exposed in bottom of crater	None
	55	300	7800	150	39.0	9.5	—	—	Fairly clean fracture of conc. Some aggr. not fract.	Sheared top layer expanded metal - 5" cover on reforc'g	3 hairline cracks from crater to N. edge - 48' to 78' lg.
	56	500	7620	121	21" along edge	17" along side of slab	132 along bottom edge	2.6 on side of slab	Irregular fracture of concrete	Sheared 2 layers expanded metal - 4 1/2" cover on reinf.	None
6	61	300	7800	150	* Top 25.0' Bot. 14.0'	4.0 Perforation	28.0	8.0	Clean fracture of concrete Aggregate also fractured	Sheared both layers expan. metal - 2" cover top - 3" on bot.	1 crack to W. edge - 1 crack extended 9.5 ft. easterly
	62	500	7810	119	* Top 32.0' Bot. 17.0'	2.5 Perforation	35.0	9.50	Fairly clean fract. of conc. Aggregate also fractured	Sheared both layers expan. metal - 2" cover on both layers	4 cracks to W. edge of slab 4 to 12 ft. long
	63	500	7830	111	* Top 28.0' Bot. 18.0'	3.25 Perforation	36.0	8.75	do	do	2 cracks 9 ft. to E. edge 16 ft. in W. direction
	71	500	7760	140	63.0	13.5	—	—	Asphalt fract. in smooth planes of irreg. orientation	—	None visible - evidence of slab being cracked through
7	72	500	7930	125	48.0	14.5	—	—	do	—	None

\*First number indicates slab number

\*See detail c "Effects of Bomb Hits"

SLAB DETAIL	CLASS OF CONCRETE	SLAB NO.	REINFORCEMENT
	B	①	2 layers expanded metal 3" x 8" mesh 2.74"/o' in each layer
	A	②	2 layers expanded metal 3" x 8" mesh 2.74"/o' in each layer
	B	③	4 layers expanded metal 3" x 8" mesh 2.74"/o' in each layer
	B	④	5 layers welded wire fabric 4" x 4" mesh - #2 gage 1.16"/o' in each layer
	B	⑤	4 layers expanded metal 3" x 8" mesh 2.74"/o' in each layer
	B	⑥	2 layers expanded metal 3" x 8" mesh 2.74"/o' in each layer
	Asphalt	⑦	Asphalt slab - Sheet asphalt Asphalt Institute Specification A-4 Asphalt penetration 100-120

#### DETAILS OF BURSTER SLABS

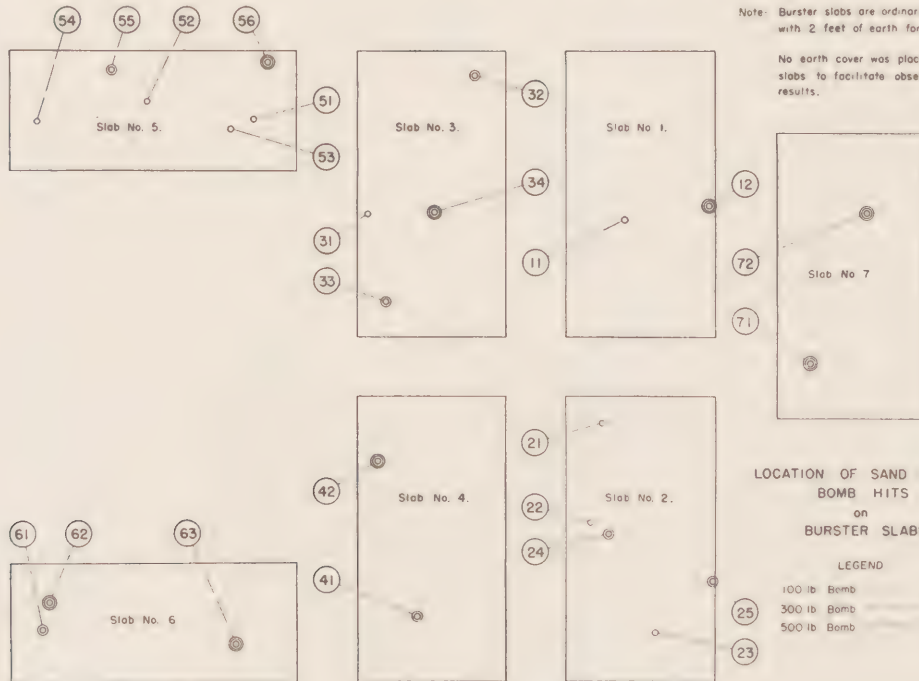


#### LAYOUT OF BURSTER SLABS

Slabs 1, 2, 3, 4 & 7 25'-0" x 48'-0"  
Slabs 5 & 6 20'-0" x 48'-0"

Note: Burster slabs are ordinarily covered with 2 feet of earth for camouflage.

No earth cover was placed on test slabs to facilitate observation of results.



#### LOCATION OF SAND FILLED BOMB HITS on BURSTER SLABS

LEGEND  
100 lb Bomb ○  
300 lb Bomb ●  
500 lb Bomb ⊙

PLATE NO. IX.  
RESULTS OF SANDFILLED BOMB TESTS ON BURSTER SLABS.

Bomb specifications:

100-pound demolition M30 (sandfilled).

300-pound demolition M31 (sandfilled).

500-pound demolition M43 (sandfilled).





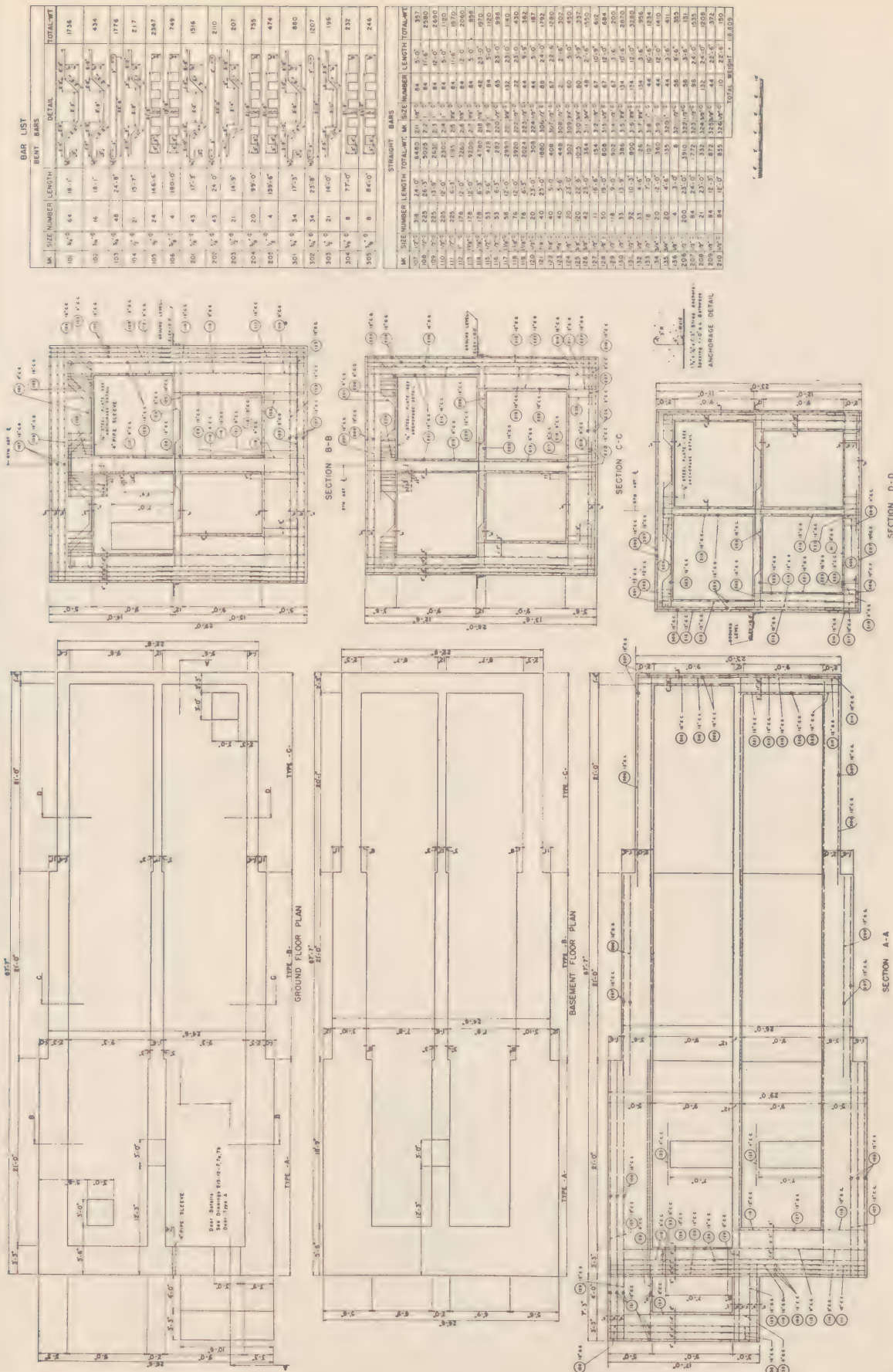
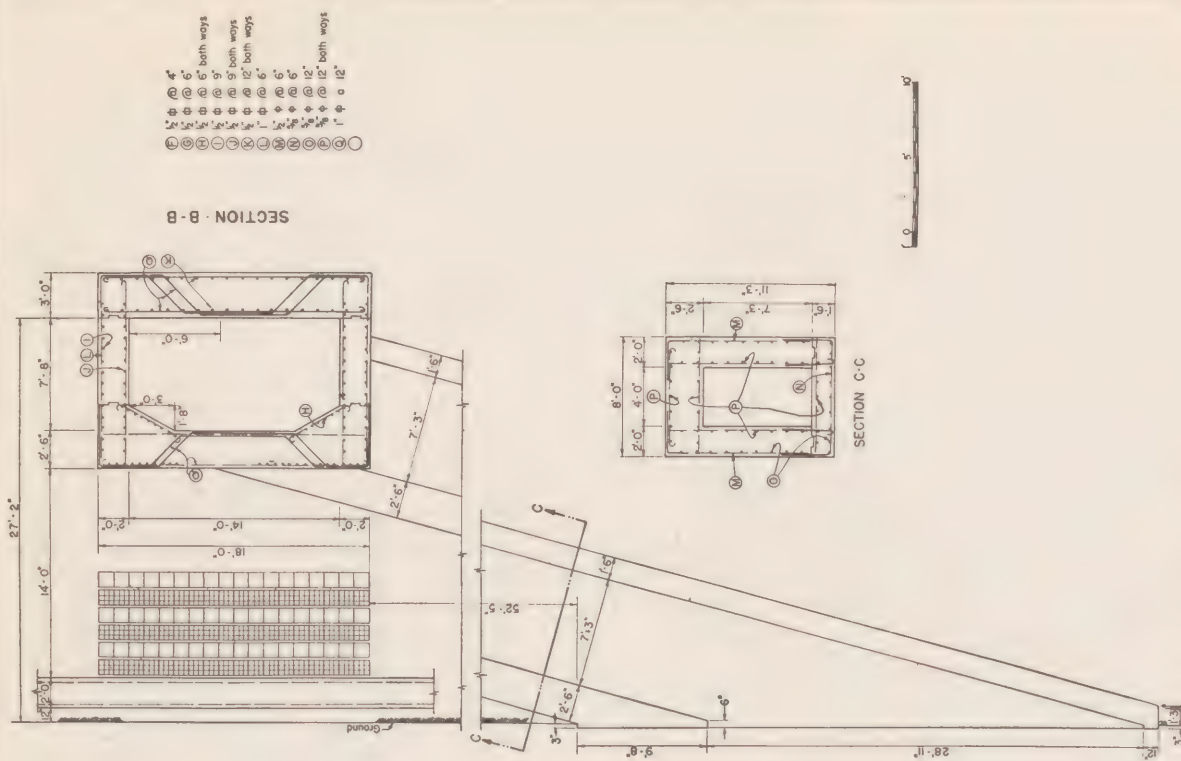
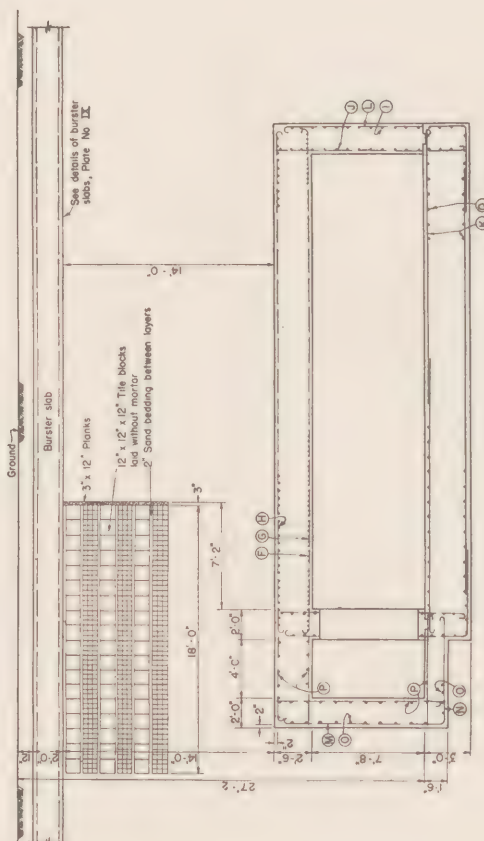
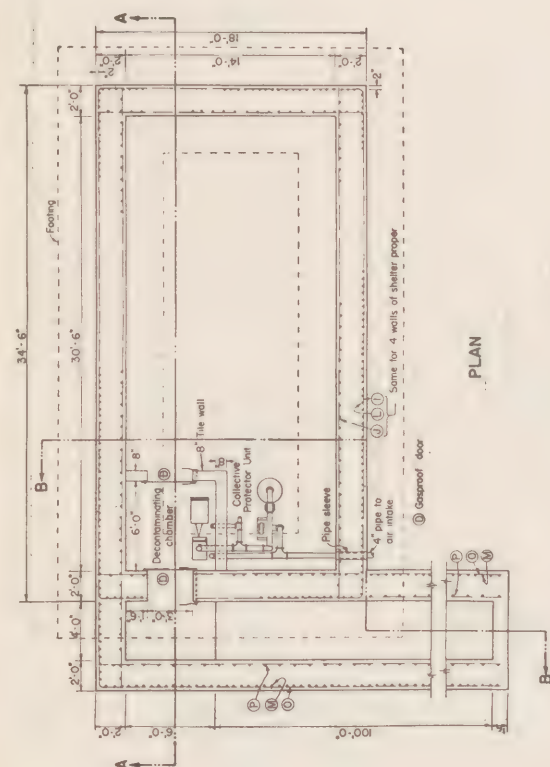


PLATE NO. XI.  
BOMBING TESTS. BOMBPROOF SHELTER B.







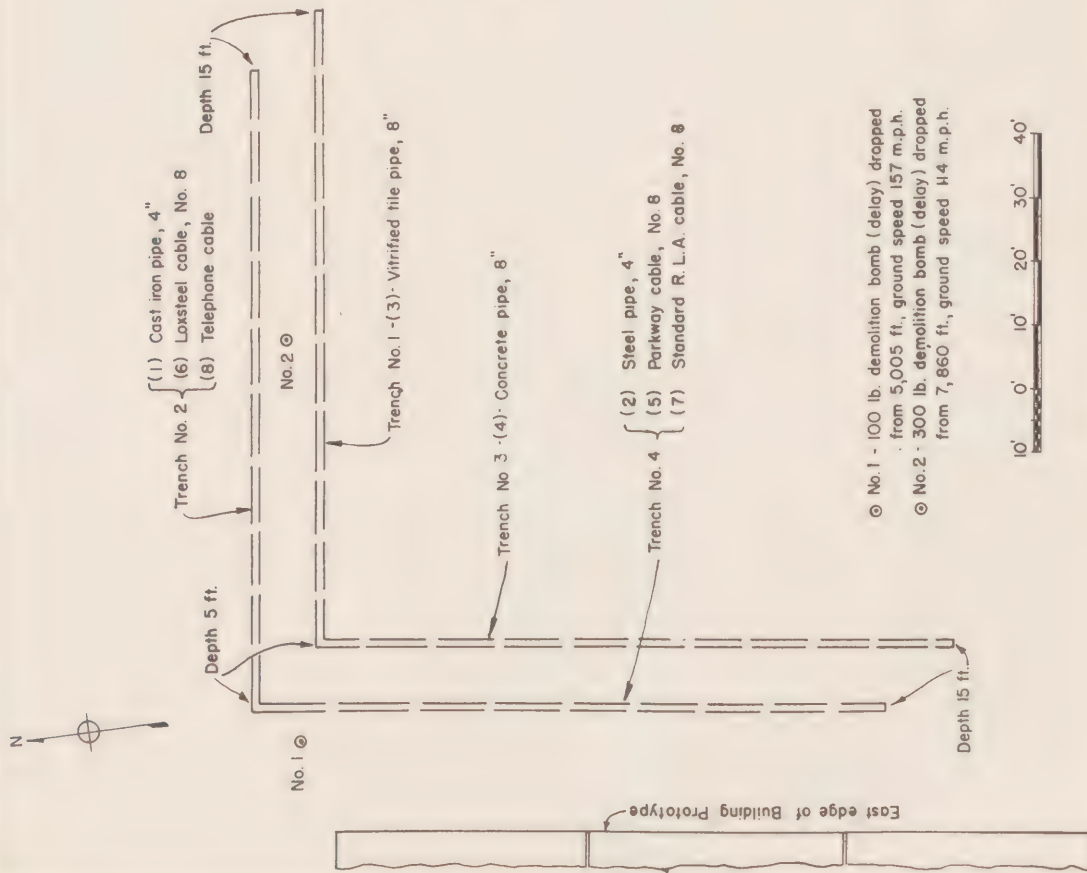
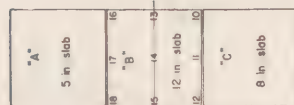


PLATE NO. XIII.

PLAN AND LAYOUT OF BOMB TESTS ON UTILITIES.



BUILDING PROTOTYPE

PLATE NO. XIV.

CORNER IDENTIFICATION PLAN FOR ELEVATIONS BEFORE AND AFTER BOMBING.

Notes. Corner numbers correspond to those shown on table of elevations. Corners without numbers were destroyed during bombing tests.

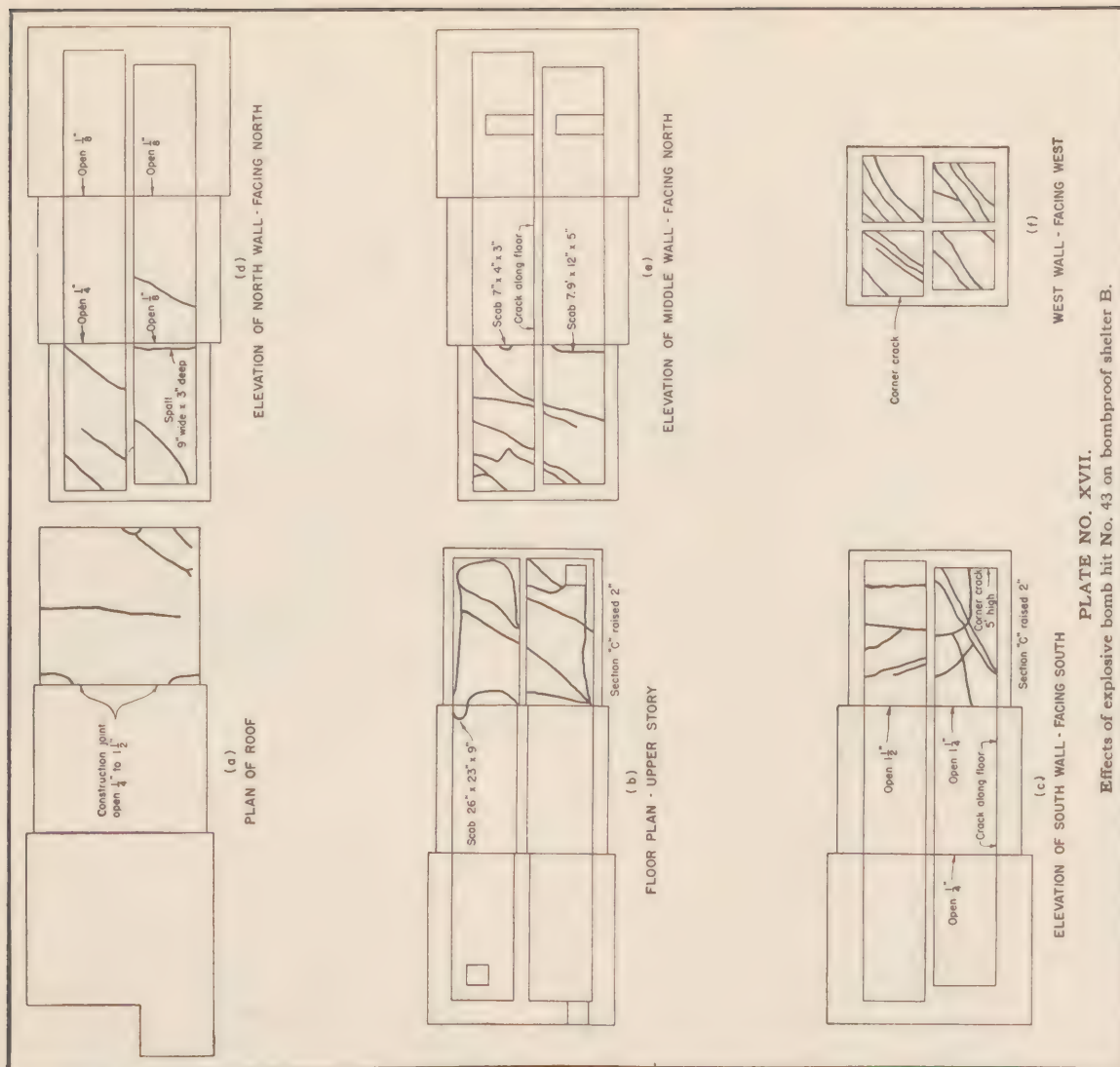
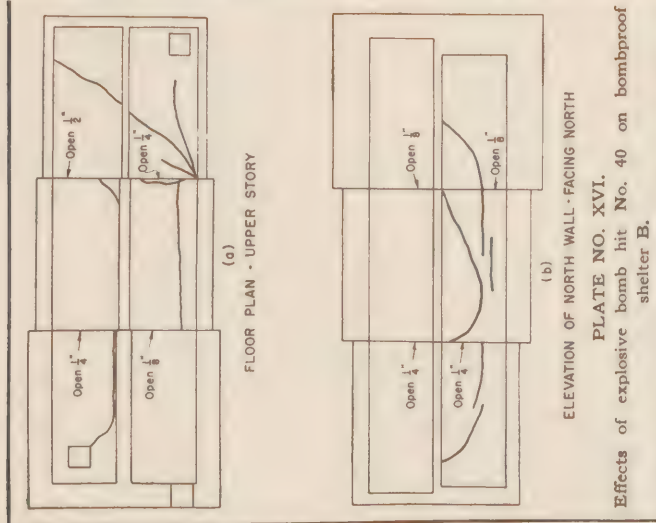


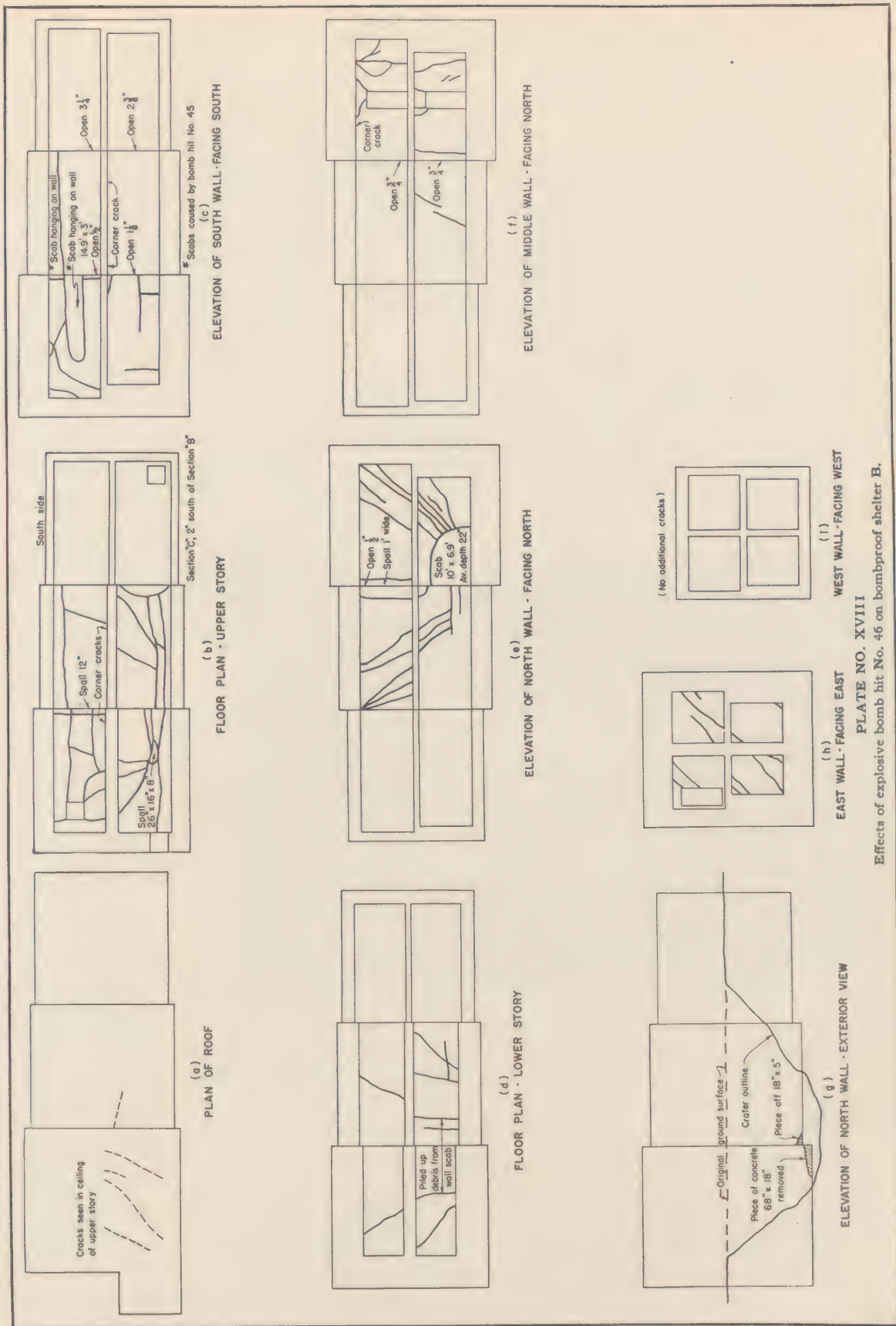
BUILDING PROTOTYPE

PLATE NO. XV.

LOCATION OF EXPLOSIVE BOMB HITS ON OR NEAR TEST STRUCTURES.

Note. Bomb hit numbers correspond to result table numbers.







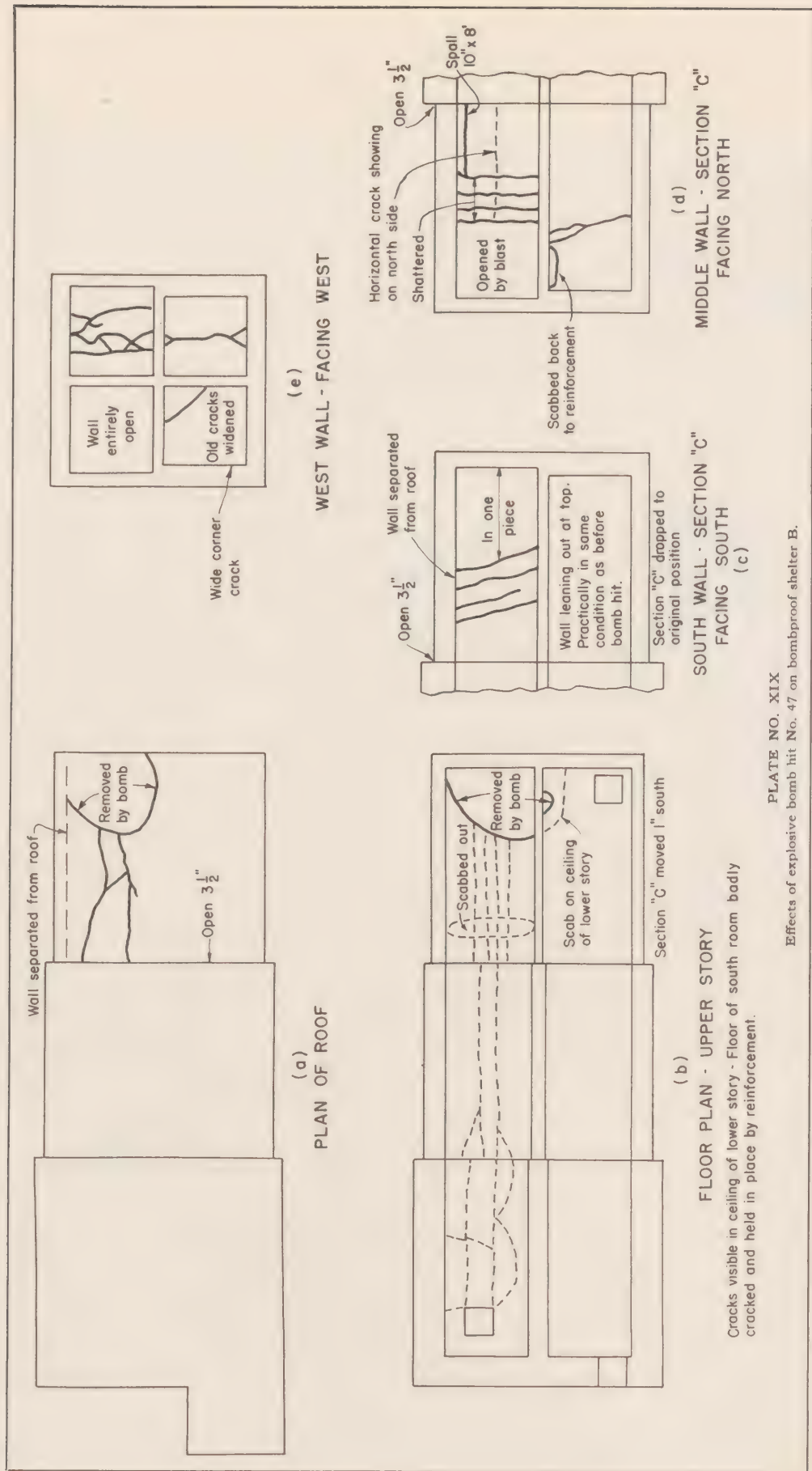


PLATE NO. XIX  
Effects of explosive bomb hit No. 47 on bombproof shelter B.

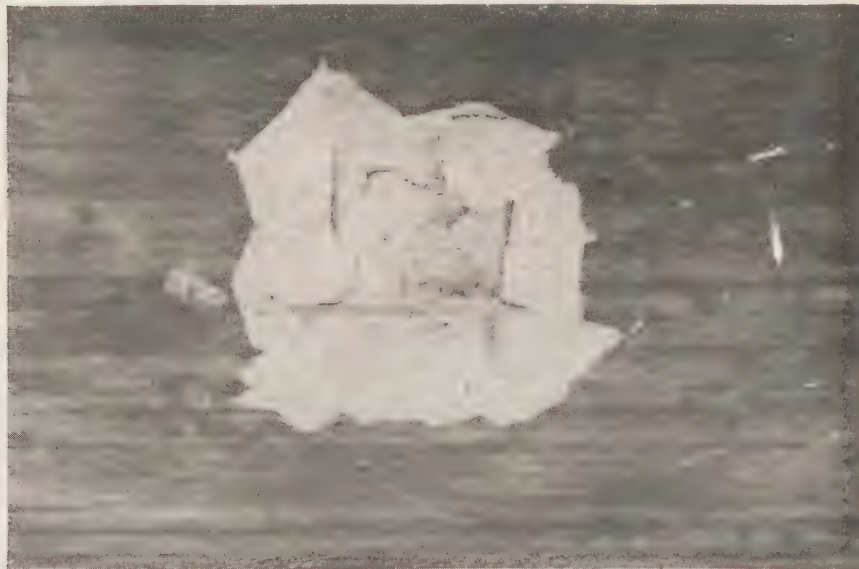
# 1. Building Prototypes

For location of Bomb Hit see Plate No. XV

Bomb hit No. and section No.	Bomb		Bomber		Crater in earth		Crater in structure. (See pl. No. IX, Effects of bomb hits.)	
	Size and type of bomb (pounds)	Fuses: Nose as noted; tail 45 seconds delay except 30 pounds	Altitude in feet	Ground speed m. p. h.	Diameter (feet)	Depth (feet)	Diameter (inches)	Depth (inches)
2-B	30-M5	Instantaneous	5,000	154			10.0	2.0

## Remarks

The impact and detonation of the bomb made a shallow crater on top of the roof slab and a comparatively large scab of 36 inches diameter and 5 inches depth underneath. The concrete fractured irregularly and four reinforcing bars were exposed, one bar in bottom layer being bent. A large number of fragment cuts were observed on top of the slab and cracks radiated from the scabbing on bottom of slab.



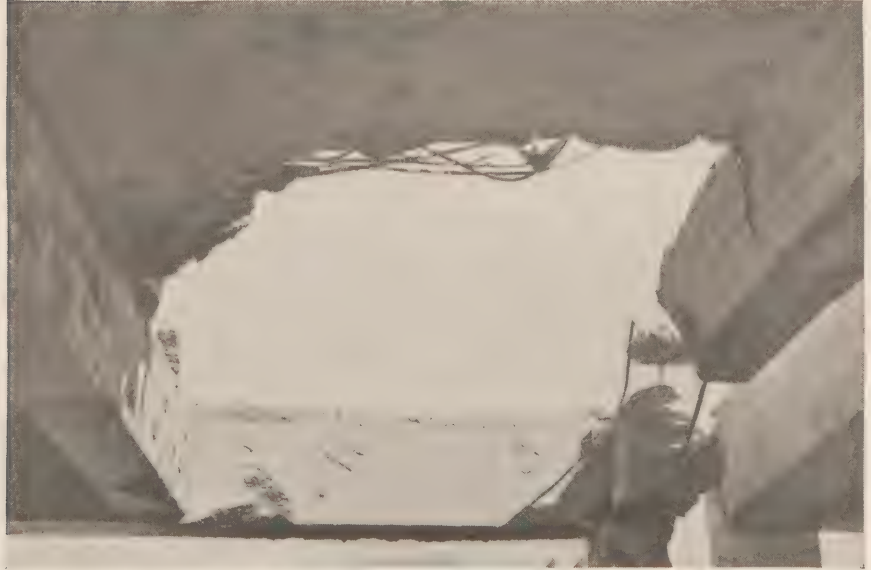
Bomb hit No. 2. Effects of scabbing on section B of building prototype made by 30-pound fragmentation bomb with instantaneous fuse.

3-A & B	100-M30	0.1 second delay	5,020	137	15.2	5.9	120 × 100	Perforation
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## Remarks

Bomb ricocheted between marginal beams of sections A and B and then hit earth under prototype, detonation taking place near column footing which was moved outward 7 inches. Blast cracked and lifted

the 5-inch roof slab and beams directly above crater in earth. One large section of the roof slab, 10 feet by 8.3 feet, and part of a beam were entirely removed. All exposed reinforcing was twisted and bent, bond was broken, and most bars pulled loose without shearing.



Bomb hit No. 3. Effects of hit on section A of building prototype made by 100-pound demolition bomb with delay-action fuse.



Bomb hit No. 3. Effects of hit on section A of building prototype made by 100-pound demolition bomb with delay-action fuse.



4-A	100-M30	0.1 second delay	5,020	137	20.4	6.9	238 by 378	Perforation
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### Remarks

Bomb perforated roof slab and detonation occurred near column in middle of north edge, section A. One entire panel and half of another were completely removed by blast. The footing and bottom of middle column were moved outward 15 inches. The concrete was scabbed and steel exposed at bottom of column. Exposed reinforcing in slabs and beams was twisted and bent. Portions of slab in four panels of north half, section A, were badly cracked as were the supporting beams.

5-C	100-M30	0.1 second delay	4,980	155	20.0	5.5		
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### Remarks

Bomb hit earth near column footing at southeast corner of prototype and detonation lifted footing, column, and corner of roof slab 9 inches above original location. Concrete spalled from top and bottom of column and exposed steel was buckled. Corner of slab and supporting marginal beams were cracked.



Bomb hit No. 5. Effects of hit in earth near section C of building prototype made by 100-pound demolition bomb with delay-action fuse.

7-C	100-M30	0.1 second delay	4,980	157	14.5	4.5	Top, 27.0; bottom, 22.5.	1.5
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### Remarks

Bomb went through perforation made by sand filled bomb and detonated in earth. The scab was 47 inches in diameter and 6.50 inches in depth. Slabs and beam in south half of section A were badly cracked, the footing and bottom of column being moved outward about 3 inches. Two reinforcing bars in top layer were sheared, adjacent bars were twisted and spread. Concrete was spalled from columns, slabs, and beams.

8-A	100-M30	0.1 second delay	4,980	157	20 by 31	6.0		
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### Remarks

Bomb went through opening where slab had been removed by bomb hit No. 4. All of shattered concrete in panels at north end of section was removed leaving panels entirely open. Middle footing and column on west side moved outward 2 feet. All exposed reinforcing was twisted and bent, the steel in base of column was buckled.

9-A	100-M30	0.1 second delay	5,050	144	19.5	Disturbed, 8.0; ac- tual, 4.8.		
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Bomb hit No. 9. Effects of hit on section A of building prototype made by 100-pound demolition bomb with delay-action fuse.



Bomb hit No. 9. Effects of hit on section A of building prototype made by 100-pound demolition bomb with delay-action fuse.

### Remarks

Bomb hit on roof slab already shattered by previous hits and detonation occurred in earth beneath. Entire slab above detonation was removed, the column at center of section showing evidence of Euler failure. Exposed reinforcing bars were twisted and bent, bond was broken, and most bars pulled loose without shearing.

14-A	100-M30	0.1 second delay	5,250	104				
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### Remarks

Bomb hit on roof beam, previously damaged, and broke out a section about 12 inches long, 10 feet of the beam being shattered. Three longitudinal bars in top of beam were exposed. Concrete in adjacent beams was spalled by fragments.

15-B	100-M30	0.1 second delay	5,250	104	16.0	4.4	Top, 17.0; bottom, 10.0.	3.1
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### Remarks

Bomb perforated roof slab and detonated in earth beneath. Scabbing on slab had a diameter of 47 inches and a depth of 8.9 inches. Fragments penetrated the underside of slab and cracks were observed on top of slab as well as at junction of slab and marginal beam. No reinforcing bars were sheared although exposed bars in top and bottom were bent. The maximum fragment penetration in concrete was  $2\frac{3}{4}$  inches.





Bomb hit No. 15. View of surface crater on section B of building prototype made by 100-pound demolition bomb with delay-action fuse.



Bomb hit No. 15. View of scabbing underneath slab of section B of building prototype made by 100-pound demolition bomb with delay-action fuse.

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35-B and C	600-M32	0.1 second delay	8,300	150	31.0	7.0		
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### Remarks

Bomb hit and detonated in earth near west adjoining column footing of section B and C, exposing and undermining the footing for 2 feet. Concrete on these columns was shattered at junction with beams and the roof slab was badly cracked.

38-C	600-M32	0.1 second delay	8,130	116	Indeterminate	Indeterminate		
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### Remarks

Bomb detonated in earth demolishing southeast column of section C and cracking floor slab diagonally between nearest columns. This triangular portion of slab was left hanging by steel reinforcing. Dowel bars of column footing were pulled out clean from column and footing was deposited intact 45 feet southwest of original location.



Bomb hit No. 38. Effects of hit in earth near section C of building prototype made by 600-pound demolition bomb with delay-action fuse.

39-C	600-M32	0.1 second delay	7,810	125	Indeterminate	Indeterminate		
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### Remarks

Bomb hit and detonated in earth, tearing middle column on east side of section C loose from footing and moving it 20 inches out of line. Column was connected to slab only by twisted reinforcing.

## 2. Bombproof Shelter B

For location of Bomb Hit See Plate No. XV

Bomb hit No. and section No.	Bomb		Bomber		Crater in earth		Crater in structure. (See plate No. IX, Effects of bomb hits.)	
	Size and type of bomb (pounds)	Fuses: Nose as noted; tail 45 seconds delay except 30 pounds	Altitude in feet	Ground speed, m. p. h.	Diameter (feet)	Depth (feet)	Diameter (inches)	Depth (inches)
1-C	30-M5	Instantaneous	5,000	152		4.0	13 by 5	1

**Remarks**

Bomb hit on south wall, section C, spalling concrete from wall and then penetrated earth for a depth of 4 feet but failed to explode. Concrete was spalled from wall with no other damage.

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31-B	600-M32	0.1 second delay	5, 120	143			23.0	16.0
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**Remarks**

Bomb hit normal to and in edge of crater made previously by sand-filled bomb (No. 3) and spalled roof a diameter of 44 inches and 88 inches down side of slab. Additional penetration and damage was not extensive. No reinforcing bars were sheared but all exposed bars were twisted and bent. Numerous fragment cuts were observed on the south wall, the maximum depth of which was  $4\frac{1}{2}$  inches. A slight separation was noted in the construction joint at roof of sections A and B.



Bomb hit No. 31. Effects of hit on section A of bombproof shelter B made by 600-pound demolition bomb with delay-action fuse.

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40-B	600-M32	0.1 second delay	7, 810	125	26 by 36	6.2		
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**Remarks**

Bomb hit earth and functioned from delay tail fuse. Construction joints between sections A, B, and C were opened and dowel bars pulled out. Scabbing was caused to interior surfaces and pressure cracks were evident on north wall projecting radially from point of detonation. Drawings of structure damage are shown on plate No. XVI.



41-B	600-M32	0.1 second delay	8,350	139	Indeterminate	Indeterminate	-----	-----
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### Remarks

Bomb hit earth and detonation caused scabbing in construction joint of sections B and C. A scab 3 by 8 feet with depth of 5 inches was removed from the south wall of lower story, and a scab 1 by 5 feet with a depth of 4 inches was removed from the roof of lower story.

43-C	600-M32	0.1 second delay	8,240	143	Indeterminate	7.0 feet	-----	-----
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### Remarks

Bomb hit and detonated in earth near section C, the crater exposing wall to a depth of 7 feet. The construction joint between sections B and C was completely opened. Scabbing was caused to interior surface and dowel bars in construction joint were broken. Drawings of structure damage are shown on plate No. XVII.



Bomb hit No. 43. Separation and vertical movement at construction joint. Sections B and C of bombproof shelter B after hit by 600-pound demolition bomb with delay-action fuse.

44-A	600-M32	0.1 second delay	8,260	117	-----	-----	96 X 56 inches.	16.0
							On south wall 71 inches. 11 inches in from face depth was 33 inches; 15 inches in from face depth was 19 inches.	

**Remarks**

Bomb hit 5 foot roof slab directly over south wall, spalling the exterior of south wall and causing scabbing on the interior at roof. A scab 14.9 feet long and 3 feet high was hanging on the inside face of south wall 8 feet from floor of upper story. Concrete was shattered from reinforcing bars bending them out from center of crater. Some bars in crater were sheared by impact. Fragment cuts were noted in radial patterns over entire 5-foot roof section.



Bomb hit No. 44. Crater on roof, section A of bombproof shelter B made by 600-pound demolition bomb with delay-action fuse.

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46-A and B	600-M32	0.1 second delay	8,260	117	42 X 27	17	-----	-----
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**Remarks**

Bomb entered crater in earth made by bomb hit No. 40 and penetrated to bottom of north wall, section A, where it detonated. The north wall was damaged severely causing cracks in walls, floors, and roof and scabbing the interior surface. Concrete was shattered from reinforcing bars near detonation and all exposed bars were bent by blast, the horizontal bars being loose in concrete for some distance from detonation. A pile of concrete scabs 3 feet deep and 10 feet long was found on the floor of north room, lower story, section A. Drawings of structure damage are shown on plate No. XVIII.



Bomb hit No. 46. Scabbing on north wall, lower story, section A of bombproof shelter B after hit in earth by 600-pound demolition bomb with delay-action fuse.

47-C	600-M32	0.1 second delay	7.100	130	.....	.....	See remarks
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## Remarks

Bomb perforated roof of section C and functioned by delay tail fuse while laying on the floor of upper story. The entire end of the south room was blown out and all adjacent walls were shattered rendering this section useless for further tests. A 5- by 9.5-foot section of roof, a 7- by 8-foot section of floor and a 7.5- by 9-foot section of middle wall were also removed. The south wall was completely separated from roof. Reinforcing bars were sheared at point of impact and all exposed bars were twisted and bent. Bars on outside face of west wall were ripped from concrete for length of wall. Twelve penetrations were found on the  $\frac{1}{4}$ -inch steel ceiling plate but no perforations occurred. Two plates were torn from the roof slab and crumpled. Entrance door was bulged out 8 inches. The ladder was demolished and scattered about interior of shelter. The collective protector was overturned. Drawings of structure damage are shown on plate No. XIX.





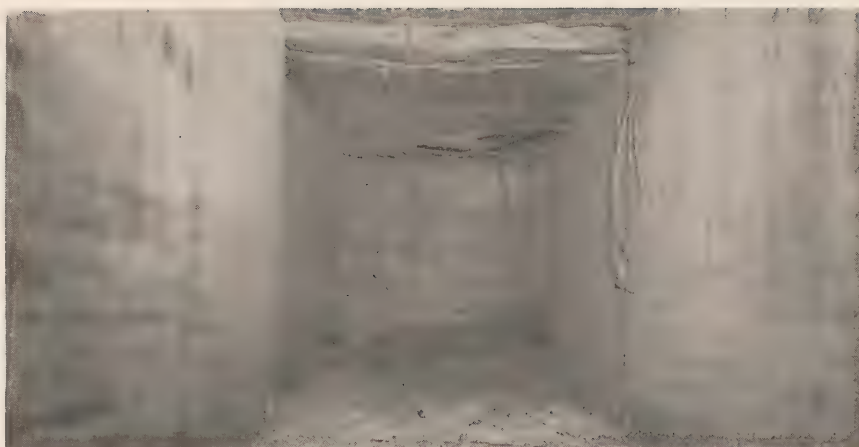
**Bomb hit No. 47. Effects of hit on section C of bombproof shelter B made by 600-pound demolition bomb with delay-action fuse.**



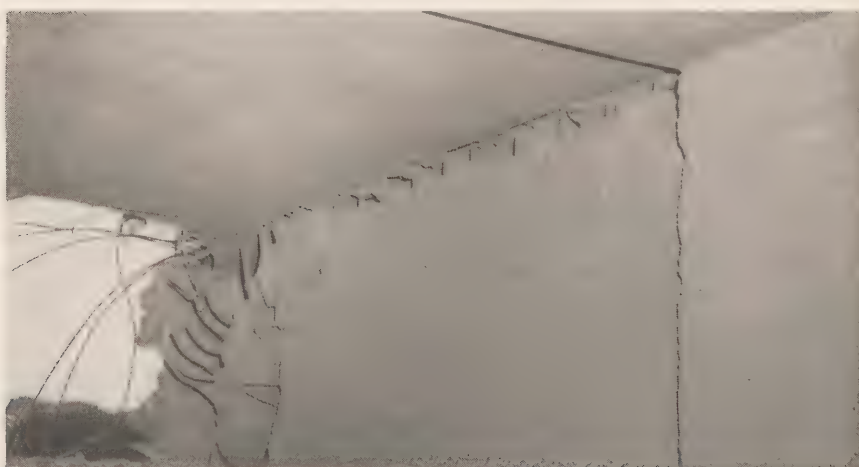
**Bomb hit No. 47. Effects of hit on section C of bombproof shelter B made by 600-pound demolition bomb with delay-action fuse.**



**Bomb hit No. 47. Separation of roof and wall, section C of bombproof shelter B made by 600-pound demolition bomb with delay-action fuse.**



Bomb hit No. 47. Interior of south rooms, lower story of bombproof shelter B after hit by 600-pound demolition bomb with delay-action fuse.



Bomb hit No. 47. Separation of roof and middle wall, upper story, section C of bombproof shelter B after hit by 600-pound demolition bomb with delay-action fuse.

### 3. Bombproof Shelter A

For location of Bomb Hit see Plate No. XV

Bomb hit No.	Bomb		Bomber		Crater in earth		Crater in structure. (See plate No. IX, Effects of bomb hits.)	
	Size and type of bomb (pounds)	Fuses: Nose as noted; tail 45 seconds delay except 30 pounds	Altitude in feet	Ground speed m. p. h.	Diameter (feet)	Depth (feet)	Diameter (inches)	Depth (inches)
11	100-M30	0.1 second delay	5,080	143			24 × 18	6.75

**Remarks**

Bomb hit entranceway ramp rupturing bomb case and causing an irregular scar on north wall and a crater on ramp floor. Detonation caused blackening of south entranceway wall and a few fragment cuts. Pieces of amatol were scattered around the vicinity. Reinforcing bars were not exposed in the crater.

**4. Burster Slabs**

For location of Bomb Hit See Plate No. XV

Bomb hit No. and slab No.	Bomb		Bomber		Crater in earth		Crater in structure. (See pl. No. IX, Effects of bomb hits.)	
	Size and type of bomb (pounds)	Fuses: Nose as noted; tail 45 seconds delay except 30 pounds	Altitude in feet	Ground speed m. p. h.	Diameter (feet)	Depth (feet)	Diameter (inches)	Depth (inches)
6-6	100-M30..	0.1 second delay.	4,980	144	Top, 6.1; bottom, 4.0	4.3	Top, 84.0; bottom, 48.0	9.0

**Remarks**

Bomb perforated slab and detonated in earth. Under surface of slab was scabbed 66 inches in diameter and 8 inches in depth. Fracture was very ragged and both layers of expanded metal were sheared, twisted, and pushed up around crater. Slab was raised up around crater and cracked to all edges.

10-4	100-M30	0.1 second delay	5,050	144			22.0	7.25
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**Remarks**

Bomb bounced on impact and detonation occurred about 10 feet above slab. A definite fragment pattern in bands was noted. Numerous fragment cuts were observed over an area 52 by 41 feet. Concrete fractured unevenly but reinforcing bars were not exposed.

12-3	100-M30	0.1 second delay	5,080	143			30.0	8.0
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**Remarks**

Bomb hit slab fracturing concrete cleanly and exposing top layer of expanded metal reinforcing, one bar being broken. Surface of slab was cut by fragments for a width of 42 feet, extending over burster slab No. 1.



13-5	100-M30	0.1 second delay	5,005	157	Top, 12 × 20; bottom, 2.5.	7.5	-----	-----
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### Remarks

Bomb detonated in earth, lifting and tilting the slab, causing separation from adjacent slab No. 3. Two cracks 17 feet long extended to east edge of slab.

16-7	100-M30	Instantaneous	5,230	124	-----	-----	29.0	4.0
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### Remarks

Bomb, with instantaneous fuse, detonated on impact causing rough fracture of asphalt and radial cuts from fragments. Small pieces of asphalt around crater felt sticky.



Bomb hit No. 16. Crater in burster slab No. 7 made by 100-pound demolition bomb with instantaneous fuse.

17-1	100-M30	Instantaneous	5,230	124	5.6 × 3.4	1.6	Concrete, 30.0.	6.75
							Asphalt, 19.0 × 32.0.	4.75

**Remarks**

Bomb hit slab No. 1, bounced, and hit alongside slab No. 7, where it detonated. Penetration in concrete slab was similar to that of sand-filled bomb. Both slabs sustained rough fractures and radial fractures were noted on asphalt slab.

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18-1	100-M30	Instantaneous	5,230	124			19.0	3.75
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**Remarks**

Bomb hit slab causing little damage. Fracture was rough but no reinforcing was exposed. Radial fragment cuts covered a 60° sector of a circle with a 15-foot radius on surface of slab.

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19-1	100-M30	Instantaneous	5,230	124	10.8 × 6.0	1.6	-----	--
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**Remarks**

Bomb hit earth near slab causing little damage. A few fragment cuts were noted.

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20-1	300-M31	0.1 second delay	6,170	119		-----	25.0	4.2
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**Remarks**

Bomb functioned instantaneously causing little damage. No reinforcing was exposed. Radial fragment cuts extended from crater over an area 14 feet in diameter.



Bomb hit No. 20. Crater in burster slab No. 1 made by 300-pound demolition bomb with delay-action fuse which functioned instantaneously.

21-6	300-M31	0.1 second delay	6, 170	119	23.5 × 18	7.2	-----	-----
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### Remarks

Bomb detonated in earth where slab had been badly damaged by previous hits. Slab was tilted and a crack 1 inch wide extended from crater to south edge.

22-7	300-M31	0.1 second delay	6, 170	119	22 × 12	7.0	-----	-----
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### Remarks

Bomb undermined and shattered a great part of slab, breaking off large pieces of asphalt. Asphalt cracked along fairly smooth planes of irregular orientation. This bomb caused a crack in construction joint of entranceway to bombproof shelter A at junction of roof, also a crack 52 feet down ramp from outside edge and another at a distance of 93 feet.

23-7	300-M31	0.1 second delay	5, 210	142	18 × 11.5	6.2	-----	-----
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### Remarks

Bomb detonated underneath east edge of slab breaking loose large pieces of asphalt over a circular area of 8 foot radius. A piece of slab 3.5 by 1.5 feet by 1.3 feet was found 40 feet north of crater.

24-6	300-M31	0.1 second delay	5, 230	140	35 × 23	7.7	120 × 324	12
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### Remarks

Bomb detonated in earth under south edge of slab, removing a large section of slab and practically demolishing the balance. Fracture of concrete was ragged and the expanded metal reinforcing was twisted and broken. Parts of some sheets, however, were found intact with the concrete shattered from them. The crack in entranceway to bombproof shelter A, 93 feet from end, caused by bomb hit No. 22 was enlarged. Some large pieces of concrete were blown on top of the building prototype, causing some damage to roof slabs.





Bomb hit No. 24. Effects on reinforcing in section C of building prototype after hit by 300-pound demolition bomb with delay-action fuse on burster slab No. 6.

25-5	300-M31	0.1 second delay	5,220	140	24.0	5.1		
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### Remarks

Bomb detonated in earth causing opening of  $1\frac{1}{2}$  inches between slabs 3 and 5. Slab was tilted but little other damage was noted.

26-5	300-M31	0.1 second delay	7,860	114			23.0	9.0
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### Remarks

Bomb hit on corner of slab shearing two top layers of expanded metal and exposing two bottom layers, but failed to explode after penetrating in earth. Edges of slab were cracked.

27-7	300-M31	0.1 second delay	8,000	116				
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**Remarks**

Bomb hit in earth near east edge of slab breaking off pieces of asphalt in fractures along smooth planes of irregular orientation. Three cracks were noted around entire entranceway of bombproof shelter A, 7.9, 42.8, and 62.3 feet (construction joint) down ramp from outside edge. One crack was noted in south wall 22.1 feet down ramp.

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28-2	300-M31	0.1 second delay	8,000	116			Top, 37.0; bottom, 15.5	6.0
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**Remarks**

Bomb almost perforated slab due to scabbing underneath (depth of 18 inches), being separated from slab. Concrete fractured unevenly and concrete lining crater was shattered. The top layer of expanded metal reinforcing was sheared, the bottom layer was not exposed. About 40 fragment cuts were noted in an area 9.5 by 10 feet around crater.

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29-4	600-M32	0.1 second delay	5,120	143	24.5	7.0 from top of slab	128 by 240 slabs, 3 and 4	Perforation
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**Remarks**

Bomb perforated slab and penetrated earth underneath where it detonated. Practically one-third of slab was demolished and an area 10.7 by 7.6 feet of slab No. 3 was shattered. Concrete was shattered and separated from reinforcement in laminated layers. A small amount of wire fabric remained imbedded in concrete and was sheared. Parts of sheets were found practically intact.



Bomb hit No. 29. Effects of hit on burster slab No. 4 made by 600-pound demolition bomb with delay-action fuse.

30-2	600-M32	0.1 second delay	5,120	143	34.0	7.0	-----	-----
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### Remarks

Bomb detonated in earth near south edge of slab raising it 6 inches, a triangular section along entire south edge and 20.5 feet along west edge being broken loose. No damage to reinforcement was noted.



Bomb hit No. 30. Cracking in burster slab No. 2 made by 600-pound demolition bomb with delay-action fuse.

32-3	600-M32	0.1 second delay	8,260	135	14 X 15	5.7 from top of slab.	124.-----	Perforation.
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### Remarks

Bomb perforated the slab and detonated in earth underneath, removing a circular section 10 feet in diameter. Sections of expanded metal reinforcing were found practically intact with concrete shattered from them. Radial cracks extended from center of crater. Steel door of bombproof shelter B was bent and door could not be closed tightly.





Bomb hit No. 32. Effects of hit on burster slab No. 3 made by 600-pound demolition bomb with delay-action fuse.

33-1	600-M32	0.1 second delay	8,260	135	Indeterminate	9.7 from top of slab	138 X 106	Perforation
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### Remarks

Bomb detonated in earth off north edge of slab entirely removing a corner section 11.5 by 8.8 feet. Expanded metal reinforcing was sheared off at edge of slab around crater. A large piece of concrete 5 by 4 feet was blown to a point 39 feet east of entranceway to bombproof shelter A.

34-4	600-M32	0.1 second delay	12,290	152	Indeterminate	8.5 from top of slab	Indeterminate	Indeterminate; perforation
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### Remarks

Bomb perforated slab and exploded in earth beneath, completely demolishing the slab. Welded wire fabric reinforcing was sheared at edge of broken blocks. The flexible intake pipe to collective protector unit in bombproof shelter B was sheared off 2 feet from end and at hangar on east end. The keeper on inside door of bombproof shelter A was broken off.

36-3	600-M32	0.1 second delay	8,240	142	Indeterminate	Indeterminate	240 × 180.	Perforation
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### Remarks

Bomb perforated the slab and detonated in earth underneath demolishing practically one third of slab as well as an area 7 by 6 feet of slab No. 1. The concrete was shattered and peeled from the expanded metal reinforcing, leaving large pieces of reinforcing intact. Reference bomb hit No. 37.



Bomb hit Nos. 36 and 37. Effects of hits on burster slab No. 3 made by 600-pound demolition bomb with delay-action fuses, illustrating laminar separation between concrete and expanded metal reinforcement.

37-3	600-M32	0.1 second delay	8,240	142	Indeterminate	10.0	84 by 192 slabs 1 and 3	Perforation
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### Remarks

Bomb hit in crater caused by bomb hit No. 36 and damage indicated was due to effects of both bombs.



Bomb hits Nos. 36 and 37. Effects of hits on burster slab No. 3 made by 600-pound demolition bombs with delay-action fuses.



General view of structures in bombing area.

42-4	600-M32	0.1 second delay	8,180	140	10.0	Indetermi- nate		
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### Remarks

Bomb detonated in earth near south edge of slab and cleared away debris from previous hits. Southwest corner of slab No. 2 exposed and undermined approximately 2 feet. Reinforcing was sheared at edges of massive pieces of concrete.



45-5	600-M32	0.1 second delay	8,260	117				Main crater: 6.7   1.8 Secondary crater: 1.5   0.7
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### Remarks

Bomb hit slab and small pieces of TNT were found scattered over north wall of bombproof shelter B and over surrounding area, indicating a low order detonation. A reddish color was left on the surface of crater and debris. Concrete in crater was shattered to second row of expanded metal and under this a small secondary crater was formed. Two layers of reinforcing were sheared, the top layer being bent and twisted. Four cracks radiated from the crater to and through other craters and to edges of slab.

48-4	600-M32	Static			13.2	5.5	156	Perforation.
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### Remarks

Bomb was placed on its side on a section of slab 11.5 by 18 feet and detonated statically to determine the effect of a bomb detonated by the delay tail fuse after the nose fuse failed to function. The concrete fractured unevenly and the reinforcing was sheared directly under bomb, the balance being twisted and bent.

49-3	600-M32	Static			7.5	3.4 from top of slab	90 X 96	Perforation
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### Remarks

Bomb was placed on its side on a section of slab and detonated statically to determine the effect of a bomb detonated by the delay tail fuse after the nose fuse failed to function. The concrete fractured unevenly and the reinforcing sheared under point of detonation but remained in place in balance of crater with concrete completely shattered from it. Five large cracks radiated from the crater.

## 5. Utilities

For Location of Bomb Hit See Plate No. XV.

Bomb hit No.	Bomb		Bomber		Crater in earth		Crater in structure. (See plate No. IX, Effects of bomb hits.)	
	Size and type of bomb (pounds)	Fuses: Nose as noted; tail, 45 seconds delay except 30 pounds	Altitude in feet	Ground speed, m. p. h.	Diameter (feet)	Depth (feet)	Diameter (inches)	Depth (inches)
1	100-M30	0.1 second delay	5,005	157	Indeterminate	Indeterminate		

## Remarks

The first joint of the 4-inch steel pipe (2) was pulled apart and the first length of pipe was bent. The pipe was recoupled and when pressure was applied no other breaks were found. No damage other than slight bending was observed for the parkway cable (5) and the standard R. L. A. cable (7).

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2	300-M31	0.1 second delay	7,860	114	Indeterminate	Indeterminate	.....	.....
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## Remarks

An 8-foot section of Loxsteel cable (6) was broken and damaged although the armor covering remained intact. At four points the lead sheath, wrapping, and copper wires were broken. No other breaks were found. One end of the telephone cable (8) was found to have a very sharp break and the conduit completely shattered in the vicinity of the crater. The other end of the telephone cable could not be located.

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## Conclusions

### Sandfilled Bomb Tests

*Building prototypes.*—The impact of the sandfilled bombs caused local damage and in every case resulted in perforation of the concrete slabs. It was noticed that the depth of the scab was proportionately much greater with a thinner slab than with a thicker one.

It was also noticed that the reinforcing bars, with a few exceptions, were not broken. This suggests that the concrete and reinforcing steel acted separately in resisting the penetration of the bombs. This might be expected since the shock wave travels at a velocity of about 9,000 feet per second in concrete, 17,000 feet per second in steel, and the destructive effects of shock precede the physical displacement of material by the bomb. Observation of damage indicates that the bond between the reinforcement and concrete is destroyed by the shock so that reinforced concrete in the immediate impact area consists of concrete containing loose bars. The value of reinforcing in resisting penetration therefore is believed to be relatively small. Tests show that a large number of small bars are more effective than a smaller number of large bars having equivalent area. The greater bond area apparently helps and the fragments of concrete are smaller.

The destruction of bond by shock indicates that splices for any intended transfer of stress from one portion of the reinforcement to another dependent upon bond is liable to failure. Mechanical connection by welding, use of hooks, or other means is clearly demanded for best results.

*Bombproof shelter B.*—Sandfilled bombs which struck bombproof shelter B were stopped with the formation of a small crater, except when the bomb hit near the edge of the roof. In this case a much larger amount of concrete was broken off, apparently because there was less lateral support than in the case of a hit in the center of the slab. If feasible, concrete structures should be built with rounded surfaces for best resistance against bombs.

*Burster slabs.*—The results indicated that the 1-foot burster slab was entirely inadequate in resisting the penetration of the bombs used for the tests. The 2-foot slab resisted penetration of bombs up to 500 pounds in weight. There is, however, some question as to the effect of the sandfilled bombs. Apparently the sand does not give the same support to the bomb case as cast TNT so that somewhat greater penetration may be expected with a bomb of equal weight loaded with explosive. The 600-pound explosive bombs, with approximately the same sectional pressure but with a case slightly heavier in the nose section, perforated the 2-foot slab without difficulty. No definite conclusions can be drawn from these tests as to the effect of the strength of the concrete or the variation in the type of reinforcing insofar as resistance to penetration is concerned.

Small scale tests, made with armor-piercing projectiles, show that higher strength concrete does offer greater resistance to penetration within limits. From observation of the effects of the impact of the bombs, it is not felt that the type of reinforcing is a matter of great importance in resisting penetration.

The penetration of the sandfilled bomb striking the sheet asphalt slab was greater than that of the bombs of the same size striking concrete slabs. However, the resistance was surprising and the shattering was less than in the case of the concrete. The reduced damage to the case of the bomb would make this material less suitable for use as a burster slab than concrete. Further tests are being made with asphaltic concrete using large aggregate.

## **Explosive Bomb Tests**

*Building prototypes.*—A surprising amount of damage to concrete columns and beams was done by splinters. In one case all the concrete cover was knocked off and a considerable portion of the concrete inside the vertical column steel was damaged. To avoid this damage, a protective covering of brick, which seems to suffer less from shattering action, might be employed, or the columns might be located within the exterior wall where they would be less susceptible to damage from bombs hitting outside the structure.



A considerable amount of damage was observed as the result of earth shock. The footings of the buildings were moved laterally, or lifted up by the effect of bombs exploding in the ground nearby. This resulted in serious damage to the frames of the structures. Reports from abroad and the results of these limited tests indicate that a steel frame building, being more elastic, would suffer less damage from the direct effects of bombs than a concrete frame building. In either case, the structures should be designed as a continuous frame and in such a way that lateral movement of the footing or destruction of a column will cause minimum damage to the building as a whole.

The serious damage caused by bombs exploding underneath portions of the building prototypes showed clearly that the damage from confined explosion is a major problem in protective construction. In the case of the tests there were no walls to assist in confining the effects of the explosion of bombs, but the concrete slabs in some cases were completely torn loose from the beams. All were seriously damaged by the upward force. It was noted in particular that failures occurred in slabs and in beams where the bars were bent up to provide for a shear. This damage suggests the need for careful design of a structure which is to be subjected to bombing for the ordinary loads and for the explosive forces which may be applied underneath the floor slab. The use of straight bars without attempting to provide for shear by bending up bars at quarter-points is recommended.

With regard to the use of blast vents to reduce damage from explosion, the results of the tests would indicate that very little value can be expected from them.

*Bombproof shelter B.*—The 5-foot thick roof of section A of bombproof B resisted the effect of the impact and explosion of 600-pound bombs. However, no hits were made in the central portion of the slab, both hits being over the exterior wall. Some cracking in the wall directly underneath the point of impact was noticed. A 600-pound bomb striking on the 2-foot roof of section C perforated the roof and exploded inside the upper gallery of the structure. The damage was severe, very heavy blast pressure resulting from the explosion. This damage emphasizes the need for an adequate roof for a structure designed to resist a direct hit. The failure of the concrete at the top of the side wall and the lack of mechanical connection of the steel emphasized the previously stated requirements that reinforcing steel should be welded or otherwise mechanically connected for greater effectiveness. Serious damage from earth shock was observed. Nearby hits caused an opening of the construction joints and cracking of the walls of the structure and bomb No. 46, which detonated in direct contact with the 5½-foot concrete wall, spalled off about 2 feet of concrete on the inside. This damage shows the urgent need of preventing a bomb from exploding in close contact with underground structures. Based on the limited information from these tests, it would appear desirable to place the structure on the surface of the ground, with a concrete apron to prevent bombs penetrating into the earth underneath. Another possibility, but one which would probably be more

expensive, would be to use this type of structure and place a concrete burster slab at the ground level, extending out for a sufficient distance to prevent explosions close to the wall underground. A revised design to provide better resistance against underground explosion is being prepared and will be issued when completed.

*Bombproof shelter A.*—There was no apparent damage to the main portion of the underground structure designated as bombproof shelter A. It had been feared that the explosion of a bomb which had perforated the burster slab over an underground structure would be very serious. However, two bombs exploded in the ground about 6 feet underneath the under side of the burster slab without damage except breaking of keeper on door. They were not directly over the central portion of the structure, however. The ramp leading into the structure was cracked by the effect of the bombs exploding in the ground nearby. The cracking of the concrete caused serious leakage of water into the structure. This difficulty and the reports from abroad indicate that underground structures are not suitable where there is a high ground water table or where there is a possibility of damage to water lines or sewers which might cause flooding. Even if the structures are completely watertight before the bombing begins, they may be cracked by earth shock and become untenable due to flooding.

*Burster slabs.*—The results of the tests with live bombs indicate that the 1-foot thick burster slab is inadequate. The 2-foot burster slab is adequate for a 300-pound demolition bomb and, based on one hit and collateral information, the 3-foot slab may be considered as satisfactory in resisting the penetration of a 600-pound demolition bomb. The severe damage caused to burster slabs from bombs hitting in the earth near the edge of the slab indicates that continued bombing might seriously reduce the effectiveness of the burster slabs by the destructive attrition at the edge.

The required thickness for instantaneous fuse bombs was shown to be much less than for delayed-action bombs.

The separation of the concrete in the plane of the expanded metal reinforcing indicates that this is not a satisfactory material. The use of welded wire fabric with a fairly large mesh—say 6 by 6—appears to offer much better results. It is not clear, as a matter of fact, that the reinforcement is of any material benefit in the construction of burster slabs, except for the purpose of tying the slab together and in preventing temperature cracks. Tests are now being made with slabs of plain concrete and with minimum reinforcing.

*Utilities.*—A complete examination of the pipe and electric cable has not yet been made. However, the results obtained so far indicate that electric cable is quite resistant to the damage from near hits, and that screwed steel pipe will withstand the effects of earth shock very satisfactorily. The amount of damage on the test does not agree with the severe damage reported from England resulting from hits at a considerable distance. Observation of the reduced damage to screwed steel pipe and cable and test reports from abroad indicate that a type of cable or pipe which will permit reasonable lateral movement without failure from earth shock will be most resistant.

Table No. 1.—*Results of concrete cylinder tests*

Structure	Class of concrete	Compressive strength at 28 days, pounds per square inch		
		Minimum	Maximum	Average
Burster slab No. 1	B	2,865	3,077	2,971
Burster slab No. 2	A	4,421	4,704	4,563
Burster slab No. 3	B	2,440	2,794	2,617
Burster slab No. 4	B	3,537	4,067	3,802
Burster slab No. 5	B	3,891	3,891	3,891
Burster slab No. 6	B	3,749	3,820	3,785
6 persons buried splinterproof shelter. (See plate No. II.)	A	4,492	5,376	4,993
6 persons semiburied splinterproof shelter. (See plate No. VII.)	A	3,749	3,784	3,767
6 persons surface splinterproof shelter. (See plate No. VIII.)	A	4,916	5,376	5,087
Building prototype	A	3,784	6,154	4,726
Bombproof shelter B	B	2,653	5,199	3,458
Bombproof shelter A	B	*2,900	4,774	3,652

\*NOTE.—Two cylinders from the pour on the entranceway indicated compressive strengths of 1,601 and 1,309 pounds per square inch, respectively. There were indications that these cylinders were frozen. As the structure was buried and proper curing temperature maintained, these cylinders were disregarded in compiling the results.

Subsidence Table No. 2.—*Building prototype*

[See plate No. XIV for corner identification]

Corner No.	Elevation (M. S. L.)		Subsidence, feet
	Before bombing	After bombing	
10	38.90	38.18	—0.72
11	38.85	38.02	—0.83
12	38.93	37.54	—1.39
13	38.90	38.44	—0.46
14	38.90	38.41	—0.49
15	38.90	38.03	—0.87
16	38.91	38.78	—0.13
17	38.91	38.72	—0.19
18	38.92	38.62	—0.30



**Subsidence Table No. 3.—*Bombproof shelter B***

[See plate No. XIV for corner identification]

Corner No.	Elevation (M. S. L.)		Subsidence, feet
	Before bombing	After bombing	
40-----	51. 06	50. 27	— 0. 79
41-----	51. 04	50. 09	— 0. 95
42-----	51. 05	50. 14	— 0. 91
28-----	51. 06	50. 35	— 0. 71
29-----	51. 05	49. 93	— 1. 12
30-----	51. 09	50. 56	— 0. 53
31-----	51. 09	50. 19	— 0. 90
32-----	49. 65	49. 12	— 0. 53
33-----	49. 62	48. 67	— 0. 95
34-----	49. 62	49. 25	— 0. 37
35-----	49. 61	48. 79	— 0. 82
36-----	48. 17	47. 76	— 0. 41
37-----	48. 16	47. 24	— 0. 92
38-----	48. 15	47. 77	— 0. 38
39-----	48. 14	Shattered	-----

**Subsidence Table No. 4.—*Entranceway to bombproof shelter A***

[See plate No. XIV for corner identification]

Corner No.	Elevation (M. S. L.)		Subsidence, feet
	Before bombing	After bombing	
1-----	38. 66	38. 39	— 0. 27
2-----	38. 64	38. 43	— 0. 21
3-----	38. 69	38. 42	— 0. 27
4-----	38. 64	38. 40	— 0. 24

**Subsidence Table No. 5.—*Burster slabs***

[See plate No. XIV for corner identification]

Corner No.	Elevation (M. S. L.)		Subsidence, feet
	Before bombing	After bombing	
14-----	37. 23	36. 64	— 0. 59
15-----	37. 28	36. 74	— 0. 54
18-----	37. 30	36. 72	— 0. 58
20-----	37. 36	35. 74	— 1. 62
21-----	37. 37	35. 04	— 2. 33
23-----	37. 23	36. 80	— 0. 43
36-----	37. 37	37. 09	— 0. 28
38-----	37. 36	37. 15	— 0. 21
39-----	37. 31	36. 52	— 0. 79
41-----	37. 34	36. 55	— 0. 79

#### PLATE IV

(Legends continued from p. 8)

*Bomb No. 6. 600-pound demolition bomb detonated statically 10 feet from shelter.*

Effects: (L) Explosion removed earth cover exposing a 15-foot length of the shelter nearest bomb. The rear half of shelter was bent, the end being lifted 29 inches and moved laterally 17 inches away from explosion. The lower side, 4 feet from end, was dished in 1.3 feet and the resulting elliptical shape had axes of 7.0 and 4.8 feet. This dished-in effect extended over a 12-foot length of the lower side of shelter. The plate at the rear end of shelter was slightly bent and the joints were opened, but no bolts were sheared. (M) The crater resulting from the detonation had a surface diameter of 35 feet, a bottom diameter of 13 feet, and a depth of 8 feet.

*Bomb No. 7. 600-pound demolition bomb detonated statically 15 feet from shelter.*

Effects: (N) Explosion removed considerable earth cover and exposed the middle third of the shelter on the side near detonation. The bottom of the door was covered by earth, but could be easily opened by hand. The rear of the shelter was raised by the explosion so that it was 3.4 feet higher than the front. The lower side at the middle of the shelter was dished in 1.1 feet and the resulting elliptical shape had axes of 5.1 and 6.9 feet. This dished-in effect extended over a 17-foot length of the lower side of shelter. Some of the joints were opened, but none of the bolts were sheared.

#### PLATE VII

(Legends continued from p. 10)

*Bomb No. 4. 300-pound demolition bomb detonated statically 15 feet from shelter.*

Effects: (H) The door was undamaged and remained in place. (I) Numerous cracks appeared in earth cover but no penetrations of the shelter could be found.

Remarks: During the release of live bombs from airplanes the following bombs fell near enough to the shelter to produce observed effects. The bomb charge was 50-50 T. N. T. and Amatol, with 0.1 second delay nose fuse and 45 second delay tail fuse.

*Bomb No. 5. 100-pound demolition bomb released from bomber—hit 9.5 feet from shelter.*

Effects: (J) Earth cover was removed from corner of shelter near explosion, exposing corrugated iron side and concrete end of shelter. (K) Three cracks occurred in rear concrete end wall 25", 9", and 18" long, running diagonally from emergency exit plates. (L) No damage occurred due to fragments. (M) Earth from crater and cover on shelter scattered over surrounding area. Crater diameter was 17.3 feet and depth was 3.3 feet.

*Bomb No. 6. 100-pound demolition bomb released from bomber—hit 6.3 feet from shelter.*

Effects: (N) The rear of shelter was lifted 6 inches above the original position tilting the entire structure. (O) Earth cover from rear and side of shelter was scattered, exposing this part of the shelter but not materially damaging it. (P) No damage occurred due to fragments. (Q) The resulting crater had a diameter of 18 feet and final depth of 4.5 feet.

#### PLATE VIII

(Legends continued from p. 10)

Remarks: After the above tests were completed, the steel door was installed on the outside of the entrance and held in place by 2" x 4" timber braces from the opposite wall and the following test was made.

*Bomb No. 4. 300-pound demolition bomb detonated statically 15 feet from shelter.*

Effects: (I) The door was undamaged and remained in place. (J) Most of the concrete was broken from entranceway wall and reinforcing steel was bent. Extensive damage had been caused by previous tests.

Remarks: During the release of live bombs from airplanes the following bombs fell near enough to the shelter to produce observed effects. The bomb charge was 50-50 T. N. T. and amatol, with 0.1 second delay nose fuse and 45 second delay tail fuse.

*Bomb No. 5. 600-pound demolition bomb released from bomber—hit 14 feet from shelter.*

Effects: (K) The shelter was knocked out of plumb, the side leaning toward bomb detonation 5" in 72".

*Bomb No. 6. 600-pound demolition bomb released from bomber—hit 20 feet from shelter.*

Effects: (L) The shelter was knocked further out of plumb, increasing the previous slope to 8" in 72".











*Memorandum on*

# **MUNICIPAL SIGNALING SYSTEMS**

**INCLUDING SPECIFICATIONS FOR  
EMERGENCY ELECTRICAL POWER EQUIPMENT**

*Prepared by*

*Defense Communications Board*



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# MUNICIPAL SIGNALING SYSTEMS

**M**UNICIPAL signaling systems constitute an important line of defense against accident, sabotage, or attack. Unfortunately, these services themselves are subject to sabotage. Damage to the communication system means that sabotage elsewhere becomes easier and is more likely to be effective.

Sabotage would probably be attempted first on the more obviously vulnerable spots in the signaling system, especially if by damaging those vulnerable areas the entire system could be paralyzed.

It is suggested, therefore; that municipalities undertake adequate surveys of their normal and emergency signaling systems, in order to ascertain where those services most need guarding or supplementing. Once the needs are determined, the proper guards and supplements should be supplied. A complete layout should be made of police and fire-alarm communications *with plans and maps*. A brief outline for making such a survey appears on page 3.

## CENTRAL POLICE AND FIRE-ALARM HEADQUARTERS.

The central station is the brain and key to the whole fire and police signaling system. The reception of messages, the location of emergency calls, the proper dispatching of protection forces—all depend upon the proper functioning of the signaling system at the central station. Sabotage at such a point would be one of the most disruptive steps an enemy could take. Therefore, certain steps should be taken to protect the central station and to arrange for effective substitute service.

a. Guard windows with opaque wire-glass and outside heavy screens, and keep them locked. Keep doors closed and locked. Keep fences and their gates, if used, tight. Allow entrance to outer enclosure and to station itself, only to persons absolutely proven to be loyal by unmistakably good credentials. Make roofs of stations fire-resistant, and bar all openings.

b. Admit no visitors or workmen other than certified signal-service personnel to the central station signaling equipment or to the area adjacent thereto. Bar visitors and workmen from the signaling equipment by walls or screens with closed and locked doors and with no other openings.

c. *Equip the central station with a wholly self-contained source of electrical energy such as a Diesel or gasoline engine with generator.* (See specifications beginning on p. 4.) See that outside sources of energy and of communication are in duplicate or triplicate, if possible.

d. Provision should be made, in case of destructive sabotage or other attack upon the personnel or equipment of the central station, to receive elsewhere and to relay to the fire or police all signals sent in from locations needing and relying upon the protective forces. Any equipment needed for a quick change from centralized to decentralized signaling such as signals from signal boxes in any one district direct to the regularly manned protective fire or police stations in that district, should be put in place promptly, and the conditions under which such equipment shall be used, what signals for use shall be given, and who shall put in use, should be worked out and practiced.

e. Bring all wires into central station underground.

f. Spare parts for the more vulnerable pieces of equipment in central stations should be on hand in adequate and sufficient quantities.

## ADEQUATE NUMBER AND PROPER LOCATION OF SIGNAL BOXES.

Heretofore, an insufficient number of boxes, and especially an insufficient number in certain key locations where many were needed, has meant only a somewhat increased insurance rate on properties inadequately protected. Today, a scarcity of signal boxes may enable an act of sabotage to attain a great measure of success before municipal aid can be secured.



## Municipal Signaling Systems

a. Near every key location, as ascertained by proper survey, a close spacing of boxes, and preferably a duplication of alarm circuits should be provided, and special arrangements should be made for vigilant patrolling of these portions of the municipal facilities.

b. Key locations should have more than a normal or standard number of fire and police boxes. Some boxes should actually be within the more vulnerable parts of the key location, and they should be actuated manually or automatically, or both, from within those parts. These key locations should have not merely a standard but a superstandard supply of protective signaling devices. The time saved in serving the police and fire forces may result in a great saving of life or property.

c. An immediate survey should be made in each municipality to determine the means for coordinating municipal signaling equipment and protective facilities with those of industrial plants. Properly coordinated signaling equipment may make the difference between an operating and a destroyed national defense plant.

d. The extension and distribution of the fire and police signaling systems into the newly developed residential areas is essential.

### OVERHEAD AND UNDERGROUND LINES.

a. Spare overhead conductors and cables, including cables capable of operating on the ground to bridge gaps in overhead lines caused by open lines, shorted lines, broken wires and broken poles, should be kept at various known locked locations, and provision made for adequate personnel to assure quick repair.

Duplicate routing of circuits in some cases is desirable.

b. Underground lines, though normally less subject to accident than overhead ones, are subject to intentional sabotage by entrance of saboteurs into manholes and by their dropping acid, bombs, or other destructive agency into manholes and upon the cables within. These acts of sabotage are less likely to be observed by police or pedestrians than would sabotage to overhead lines.

Means should be provided for securely and tightly closing and locking all manhole covers where fire and police alarm signaling wires are contained in cables within the manhole (sometimes in, or with telephone cables). Cables should be covered with acid-resisting shields, where possible.

Only authorized persons should ever be allowed to open a manhole, work in it, or be near it when it is open.

### PEDESTALS.

Pedestals for signaling boxes should be protected, especially if the grounding feature or threefold operation is not used on the signaling system. Because of the possibility of damage, pedestals should not be used as terminal points for important cables.

Therefore, all important connections should be removed from pedestals at the earliest possible moment, and manholes installed equipped with effective locking devices.

### EMERGENCY SUBSTITUTES FOR REGULAR SIGNALING FACILITIES.

Two-way radio equipment might be installed on all fire apparatus, mobile units, fire boats, etc., and is especially desirable where municipalities have two-way radio.

Alarm gongs or air horns should be placed on fire and police stations at locations where the best coverage could be secured. These should be connected to the existing central stations and all decentralized stations so that auxiliary police and firemen could be quickly called to duty should an emergency arise. These air horns could be used for calling off-duty firemen, auxiliary firemen and police or other personnel.

### AUXILIARY POWER SUPPLY.

All police radio stations, police signaling systems and fire alarm systems should be equipped with auxiliary power units, either Diesel or gasoline operated. They should be automatically connected so that when the normal source of supply is interrupted these units will automatically start and continue to operate during the interruption and will again automatically shut down upon the resumption of the normal supply. (See specifications beginning on p. 4.)



## Municipal Signaling Systems

### ADEQUATE TOOL AND REPAIR FACILITIES.

Adequate tool and repair facilities should be made available at central stations and placed in locked and guarded houses at strategic and sufficiently numerous locations. Needed tools and repair facilities should be so arranged as to be moved readily from place to place.

A survey should be made by each municipality to determine the adequacy of their parts and tool supply and any deficiency corrected at once.

### MUTUAL AID PROVISIONS.

A growing appreciation of the need for handling local disaster by neighborhood cooperation has brought about, in many neighborhoods, a fairly well worked out plan of mutual aid. Through the coordination of the signaling systems of the various municipalities, aid for one city can be quickly secured from other cities. In effect, the cities become one large scattered municipality for the period of the given emergency.

To supply adequate protection for large factories or other units important to defense,

municipalities should conclude mutual aid agreements and coordinate their signaling and protective services to that end.

### IDENTIFICATION AND INVESTIGATION OF PERSONNEL.

The ability of States and municipalities to operate their communication systems under present methods is dependent to a considerable degree upon the stability of both power and communication wire circuits. One of the most effective ways to halt these communications would be to destroy either power or communication facilities at some outside point. It is, therefore, recommended that police officers should as a matter of practice investigate persons observed to be working on overhead power or communication installations, or in manholes and require that such persons establish their identity and authority.

Organizations responsible for the operation of wire facilities and maintenance of power or communication wire circuits should provide their personnel with adequate means of identification, preferably including photographs and fingerprints.

## CHECK LIST FOR EXISTING SYSTEMS

### I. FIRE ALARM

- A. Central fire-alarm headquarters.
  - 1. Location—size, etc.
  - 2. Equipment.
  - 3. Personnel—operators, linemen, etc.
  - 4. Engine-house equipment, type, etc.
- B. Fire alarm boxes.
  - 1. Number—adequacy.
    - a. High—medium—low-value areas.
    - b. Residential—commercial—industrial areas.
  - 2. Circuits—number—adequacy.
    - a. Overhead.
    - b. Underground.
- C. Other types of fire-alarm communications.
  - 1. Radio.
  - 2. Voice.
  - 3. Teletype.
  - 4. Others.
- D. Power.
  - 1. Normal—battery—rectifiers.
  - 2. Reserve—number of units—size.
- E. Direct auxiliary fire-alarm connections.
  - 1. Industry.
    - a. Municipal fire alarm.
    - b. Commercial central-station connections.
  - 2. Army cantonments and bases.
  - 3. Navy yards.
  - 4. Defense housing projects.
  - 5. Auxiliary systems that could be utilized.

### II. POLICE ALARM

- A. Central police headquarters.
  - 1. Location—size, etc.
  - 2. Equipment—telephone—telegraph—teletype—radio—other.
  - 3. Personnel—operators—linemen, etc.
  - 4. Precincts—number—location—type of equipment.
- B. Number of patrol boxes.
  - 1. Circuits—underground—aerial.
- C. Power.
  - 1. Normal—auxiliary.
- D. Number of mobile units equipped with one-way or two-way radio.

### III. TELEPHONE SYSTEM.

- A. Lay-out of system.
- B. Power—normal—auxiliary.
- C. Personnel.
- D. Emergency units.

### IV. TELEGRAPH SYSTEMS.

- A. Lay-out of system.
- B. Power—normal—auxiliary.
- C. Personnel.
- D. Emergency units.

### V. RADIO SYSTEMS.

- A. Commercial (broadcasting, emergency).
  - 1. Stations—location—personnel.
  - 2. Power facilities.
  - 3. Emergency arrangements.
- B. Amateur.
  - 1. American Radio Relay League.
  - 2. Stations—power facilities.

## EMERGENCY ELECTRICAL POWER EQUIPMENT

Continuity of communications requires the availability of an emergency power supply. Emergency power systems have been designed for many types of services and to supply power under many conditions. A recommended specification, to be used as a guide, may be of material assistance to states and municipalities in securing the proper type of equipment for the operation desired.

The specifications are divided into five units because of the different circumstances and conditions under which emergency power is required. For electrical power to drive a system involving telegraph printers, a strict control of power frequencies is generally required. There are two specifications to meet these conditions, one covering gasoline (Type 2) and the other Diesel power (Type 4). If telegraph printers are not involved, a less strict power frequency is required with consequent saving in initial cost. Two specifications are provided in this category, one for gasoline (Type 1) and one for Diesel (Type 3). Type 5 is a power system readily transportable, suitable for use in providing flood lights or driving electric pumps or other portable electrical apparatus.

### GENERAL SCOPE

The following specifications are applicable to stand-by electric generating plants for the operation of fire-alarm systems, police radio systems, police telegraph systems, telephone systems, X-ray, emergency lighting, and the powering of electric motors.

Stand-by electric generating plants can be supplied commercially in the following sizes: 1.5, 3.0, 5.0, 7.5, 15.0 kilowatts. This range of sizes covers the maximum recommended for use with gasoline engines. For reasons of safety and economy of operation, Diesel engines are recommended for plants in excess of 15.0 kilowatt rating.

The purchaser should determine the type and size of unit required for the operation intended. The specification tables herein will assist in this determination. The following details should be considered when purchasing a generating unit for any of the above uses:

(1) The amount of current needed to operate equipment, lights, appliances, motors, etc., at

the time of *peak demand*. (Electric motors require from twice to eight times the normal rated current for starting, depending on type and size.)

(2) Method of starting.

(3) Voltage output. (Whether 110 or 220 volts, single phase, or whether 110/220 volts 3-wire, single phase, or whether 220 volts 3-phase is required.)

If other than that indicated in specification table, proper designation of required voltage must be made in the proposal.

The purchaser should specify one of the following methods of starting, depending upon his individual requirement.

1. *Manual start*.—The unit is started manually, by means of a hand crank or rope. Magneto ignition must be provided on the engine.

2. *Self-start*.—The unit is started and stopped by means of push-button control, buttons being located at the plant. Starting batteries are used with the plant, providing 12 volts, but magneto ignition is used to assure starting manually in case of battery failure.

3. *Semi-automatic*.—The unit will start automatically upon main power failure and will continue to run for not less than 5 minutes and if normal source of supply is resumed after the 5-minute period, it will automatically shut down; or, if the power has not been restored, the plant will operate indefinitely.

Gasoline engines are not recommended as practical beyond a size of 15.0 kilowatts because the larger volumes of fuel which are required, which constitute a storage hazard. Gasoline fuel, when used only in stand-by service, will deteriorate if allowed to stand in storage tanks for any prolonged period of time. Therefore, if possible a Diesel is recommended for larger sizes, since Diesel fuels have greater stability and will stand longer periods of storage without serious deterioration.

*Installation of tanks*.—Gasoline storage tanks should be installed in accordance with the local fire department regulations and the regulations of the National Board of Fire Underwriters.



# SPECIFICATIONS, TYPE 1

*Gasoline driven electric generating set, 60 cycles alternating current, semiautomatic, nonfrequency regulation for use in case of power failure*

## A. APPLICABLE SPECIFICATIONS.

A-1. The specifications enumerated below of the issue in effect on the date of the Invitation for Bids are made a part of this specification.

American Standards for Rotating Electrical Machinery.

Electrical Safety Code for Electrical Installations and Wiring.

## B. TYPE.

B-1. This specification covers a semiautomatic controlled, permanently mounted, gasoline engine driven, alternating current, electric generating set, mounted on a rigid base or chassis, for installation on a concrete foundation.

## C. MATERIALS AND WORKMANSHIP.

C-1. *Materials.*—The materials for each part of the set shall be as specified herein. All parts subject to corrosion in a damp, salt, tropical climate shall be suitable to withstand corrosion or suitably protected from corrosion. When a definite material is not specified, the material used shall be of the best quality normally used for the purpose in good commercial practice.

C-2. *Workmanship.*—All parts of the generating set and controls shall be manufactured and finished in a thoroughly workmanlike manner. All dimensions shall be held as close as is consistent with good shop practice.

## D. GENERAL REQUIREMENTS.

D-1. There are no general requirements applicable to this specification.

## E. DETAIL REQUIREMENTS.

E-1. *General.*—The set shall consist of a gasoline engine, direct connected to an alternating current generator; a built-in or direct-connected exciter; a switch gear for semiautomatic and manual operation, control and protection of the set; a rigid metal base; tools, accessories, spare parts, instruction books, etc., all as described herein. The complete set shall be permanently mounted on a common subbase provided with proper holes, bolts, bushings, etc., for installation on a concrete foundation. The general design shall be such as to produce a workmanlike, practical, and satisfactory machine without the use of unproven devices. The equipment is intended for emergency stand-by operation and the design shall be such that a nontechnical operator can, with a period of special training of not more than one week duration, operate the generating set without difficulty in the dark. The set is intended to provide electric power for lighting and power, including electric motors, where the power factor of such load will vary from unity to 0.8 (approximately).

E-2. *Capacity.*—The set shall be capable of delivering continuously, at an engine speed of not to exceed 1,800 revolutions per minute, an output not less than that specified in the table of sizes for type 1, in paragraph E-3, for the size required in the accompanying proposal.

E-3. Table of sizes for type 1.

Size	Kilowatt rating capacity	Rated voltage	Frequency control from 60 cycles, maximum variation	Intermittent overload (1 percent) 1 hour, minimum	Engine horsepower delivered to generator shaft, minimum	Number of cylinders, engine, minimum	Maximum piston speed
							<i>Ft./min.</i>
A	1.5	110	±2	20.0	4.0	1	825
B	3.0	110	±2	20.0	7.0	2	825
C	5.0	110	±2	20.0	14.0	3	850
D	7.5	110	±2	25.0	18.0	4	900
E	10.0	110	±2	25.0	24.0	4	1,150
F	15.0	110	±2	25.0	38.0	6	1,150

E-4. *Engine.*—The gasoline engine shall be of a water-cooled, four-stroke cycle, vertical or V type, having the number of cylinders, horsepower delivered to the generator shaft, and piston speed, as specified in E-3, table of sizes for type 1. Operating speed shall not exceed 1,800 revolutions per minute. All power requirements as defined by this specification shall be obtained with ordinary standard, straight (unblended) gasoline, not exceeding 68 octane. The power requirements are based on standard conditions of sea level with atmospheric pressure of 14.7 pounds per square inch and ambient temperature of 60° F. The engine shall be of a standard commercial design that has proven satisfactory in extensive generating set use, and shall be one for which spare parts are readily obtainable

throughout the United States. Lubrication of engines having plain bearing crankshaft and camshaft shall be by means of either the force-feed and splash type, or force-feed type with gear-driven oil pump, and so arranged that lubrication can be maintained under all conditions of service. Lubrication of engines equipped with antifriction bearing camshaft and crankshaft may be by means of the constant level or splash type. Magneto ignition shall be provided and the entire ignition system must be shielded effectively to prevent radio interference. The engine shall be equipped with a suitable gasoline filter, a mechanical fuel pump with flexible fuel line lead, and a mechanical governor which shall control the speed to within 5 percent from no load to full load. The muffler shall be of the highest grade and shall effectively silence exhaust noise. Suit-



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able fittings shall be provided to make proper connections from the exhaust manifold to the remote exhaust outlet and 15 feet of flexible exhaust tubing shall be supplied for connection thereto. The carburetor shall be equipped with suitable air filter and back-fire trap with provisions made to trap or drain all excess fuel which might drip from the carburetor bowl under conditions of over-choking. The carburetor, fuel pump, and all other similar parts shall be constructed of corrosion-resisting materials, suitable to withstand a damp, salt, tropical climate, or otherwise protected against corrosion by suitable means such as plating, enameling, etc. The complete engine unit, including radiator and accessories, shall be so arranged that all parts are readily accessible.

**E-4a. Starting.**—The unit shall be provided with controls, such that a semiautomatic start may be accomplished at any moment when normal supply is shut off. At the moment of power-line failure, an automatic transfer switch shall open its initial connection with the power line, connect the demand circuit with the alternating-current output of the electric generator and set into operation the cranking circuit of the starting system on the engine. A safety switch shall be provided in the cranking circuit such that electric cranking will cease after approximately 10 seconds if the engine fails to start. A manual reset shall be incorporated in the safety switch to permit further operation. Any proposed control system shall be of a proven type, and full description of same, together with proof of unfailing reliability *must* be submitted with bid at the time of opening. Provision for manual starting of the unit shall be made in case the battery condition is too low to permit cranking electrically. Cranking may be accomplished by means of the generator exciter or automotive accessory type. Provision shall be made for recharging the starting battery. Starting voltage shall not be less than 12 volts, and batteries for starting shall consist of a pair of 6-volt units, connected in series. An automatic choke shall be provided. The path of the hand crank shall be unobstructed.

**E-4b. Cooling system.**—The engine shall be equipped with a suitable type of cooling system, including radiator of ample size, ventilating fan of the pusher type, and water pump—if required. Thermal-siphon systems are allowed. The system shall provide sufficient cooling capacity to keep the engine at a temperature which will insure economical and satisfactory operation when powering the generator under full rated load and with a maximum circulating water temperature of not more than 100° F. above an ambient temperature of 100° F. The engine block and radiator shall be provided with suitable water drains. A suitable protective grille shall be provided for the radiator.

**E-4c. Fuel tank.**—A fuel tank shall be provided, having a capacity of at least 55 gallons, and shall be suitable for underground installation. It shall be arranged for either gravity or pump feed to the engine, and shall be located not more than 15 feet away from the generating plant, horizontally, or more than 6 feet below the level of the fuel pump on the engine. All necessary fittings shall be provided and shall include suitable filler pipe and cap, vent pipe, supply outlet fittings, 25 feet of copper fuel line tubing, line water trap with fittings, etc. The fuel tank shall be treated inside with a protective coating of nonmetallic material suitable to reduce corrosion from the effects of water and from such corrosive elements as may occur in standard grades of gasoline. The tank shall be coated on the exterior in a commercially acceptable manner for protection against corrosion due to contact with the damp earth.

**E-5. Generator.**—A 60-cycle, single-phase, alternating current, continuous rating, semienclosed, self-ventilated generator as defined by the American Standards for Rotating Electrical Machinery shall be provided. The generator shall have a rated full load capacity as specified in E-2 and in E-3 (Table of sizes). The generator shall fulfill this capacity requirement under full service conditions including the heating effects obtained with the entire equipment assembled for operation. The exciter shall be either built-in or direct-connected to the generator shaft. All coil and winding insulation shall conform with class B insulation as defined by the American Standards for Rotating Electrical Machinery and all temperature measurements and tests shall be in accordance with American standards for the type of equipment supplied. The coils and windings shall be thoroughly treated with an oil and water resisting insulation compound. At intervals following successive applications of the compound or varnish, the coils shall be thoroughly baked. The whole machine shall be insulated and protected for continuous operation in a damp, salt, tropical atmosphere and provision shall be made to prevent failure of insulation due to condensation of moisture upon metallic parts. The terminal leads from the generator shall be brought through the frame, with suitable insulating bushings. The generator shaft shall be provided with antifriction bearing or bearings.

**E-5a. Overload.**—The generator shall operate satisfactorily in all particulars at loads up to and including full rated load plus overload as stated in table (E-3) at unity power factor without objectionable noise, vibration or heating. It shall be capable of delivering full rated load plus overload at unity power factor continuously for at least one hour and withstand a dead short circuit across the terminals for 5 seconds without injury.

**E-5b. Voltage regulation.**—The generator voltage at unity power factor shall not vary more than 11 percent of full load voltage at all points between no load and full load when the generating set is completely assembled and operating under normal conditions. The voltage regulation shall be inherent, that is, obtained without the use of separate voltage regulation devices.

**E-6. Control.**—The set shall be arranged for manual control, in addition to the semiautomatic control circuit. Provision shall be made through necessary switches so that by a simple change of switch positions, manual start by means of hand cranking or push-buttons may be made. Provision shall be made for manual stopping of the engine at any time by means of push-button or toggle switch control, without a tendency for battery cranking to set in. All necessary controls for semiautomatic operation must be supplied.

**E-7. Switchboard.**—A substantially constructed switchboard panel, of impregnated, homogeneous, ebony asbestos, compound or other similarly suitable material, with all instruments and other devices suitably mounted thereon, shall be supplied. The instruments shall consist of one voltmeter with scale of 0-150 volts alternating current; one ammeter with scale of sufficient spread to indicate at least 130 percent of rated amperage, and one zero center direct current ammeter to indicate charging rate to battery. One main circuit breaker with overload protection shall also be conveniently mounted upon the panel. A rheostat control for battery charge-rate adjustment shall be provided. The instruments shall be furnished complete with all fuses, shunts, etc., necessary for their proper operation. Each instrument and device on the panel shall be iden-



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## Electric spares

tified by stamped designation plates, stenciled with paint, or suitable identification on the particular piece of equipment. The complete switchboard panel shall be arranged for the most convenient installation near the generating unit for wall mounting or on pipe standards. A wiring diagram, showing all electrical circuits as well as identification of all terminals shall be provided, whether painted on the face of the panel, or mounted in a suitable unexposed part of the panel or control boxes, protected by suitable covering or clear shellac.

**E-8. Wiring.**—All wiring and other current carrying parts shall be proportioned so that no undue heating will occur when the set is operated under the most severe conditions. Connections shall be so secured as to prevent contact with the frame or moving parts and resist movement under stress of normal vibration. All wiring shall be in accordance with the latest edition of the Electrical Safety Code for Electrical Installations and Wiring.

**E-9. Base.**—The generating unit shall be mounted on a substantial subbase or chassis of cast iron or pressed steel, unless an oversized oil sump base is provided for this purpose. In case of the latter construction, all sections of such base shall be of generous size and proportion, designed particularly for the purpose, and not a conversion of base type oil pan for gasoline engine, as such. The base shall be extended a sufficient distance to the rear so as to provide ample footing for the balance of the complete assembly. Shock-resisting bushings, or other type of vibration dampening shall be provided with the unit so that ample cushioning may be established between the unit and concrete base.

**E-10. Finish.**—The machine shall be finished in accordance with the best commercial practice. All exposed parts and surfaces shall be properly primed and given two coats of best grade machinery enamel.

**E-11. Nameplates.**—The engine and generator shall be provided with manufacturer's nameplates bearing the serial numbers, dates, and names of the manufacturer, together with all other pertinent information usually furnished. Identification plates shall be attached to each of the boxes containing automatic control devices.

**E-12. Tools, accessories, spare parts, etc.**—

**E-12a.** All tools, accessories, and spare parts necessary for the operation and maintenance of the generating set shall be supplied. Tools and spare parts shall include the following:

### Tools

Set of standard open-end wrenches for all removable nuts, caps, and plugs.  
Set of special wrenches, extensions, spanners, and accessories required for removal and maintenance of all parts. One oil can.

### Spare parts

Set spark plugs.  
Set intake valves.  
Set exhaust valves.  
Set valve springs.  
Set valve keys.  
Set cork and copper gaskets.  
Set ignition breaker points.  
Set water hoses.  
Set hose clamps.  
One distributor cap.  
Two fan belts.  
One oil filter removal cartridge.  
One flexible fuel line connection.

One set generator brushes.

One set generator brush springs.

Ten fuses of each kind and capacity used on the set.

A set is the amount required for one engine or one generator. All tools and accessories shall be of the best quality and shall be acceptable to the contracting agent. All spare parts shall be furnished by the manufacturer of the original equipment and shall be interchangeable therewith.

**E-13. Container.**—A container of wood or metal, provided with a 1½-inch padlock complying with Federal Specification No. FF-P-101, Type VI-A, with two duplicate keys, shall be provided for the tools, spare parts, accessories, and instruction books. The container shall be arranged with suitable compartments to secure and protect the parts in a manner so as to be readily accessible. A holder shall be provided for an oil can in an accessible position.

**E-14. Instruction books.**—The contractor shall furnish for each generating plant four (4) copies of a complete instruction book covering the assemblage, description of operation, adjustment, maintenance, and replacement of parts. This manual shall include a wiring diagram and a detailed parts list having pictures or drawings with part numbers for each part of the generating set. The manual shall also include a complete description of the measures that must be taken in order to operate the set at temperatures as low as -10° F. The instructions and parts lists shall be distributed as follows:

Two copies packed with each generating plant.

Two copies mailed direct to the contracting agent.

**E-15. Standard products.**—The equipment supplied under this specification shall be new and unused and shall be essentially standard products of the manufacturers; shall be the manufacturers' latest approved designs, and shall be in regular production in order that prompt and continuing service and delivery of parts may be guaranteed.

**E-16. Ruggedness.**—The equipment to be furnished under this specification shall have demonstrated by extensive satisfactory commercial use the ruggedness essential not only for employment under the type of service for which it is herein intended, but also to withstand shock of the usual means of transportation. The contracting agent may require the bidder to show evidence of the extensive satisfactory commercial use of the equipment he proposes to furnish.

**E-17. Warranty.**—All materials and workmanship shall be of the highest grade and shall be free from any defects or imperfections. Any defect clearly due to the faulty design or to faulty material or workmanship, which may develop within 1 year after completion of the contract, unless otherwise specified, shall be made good by and at the expense of the contractor. Corrections or replacements required because of the faulty design, etc., shall be made within the continental limits of the United States by the contractor, at his expense and at the convenience of the contracting agency, at the plant of the manufacturer.

## F. METHOD OF INSPECTION AND TEST.

**F-1. Inspection.**—The contractor shall at all work hours permit the entrance of representatives or inspectors of the contracting agent, who shall have the right to follow the material through all the processes of manufacture, tests, packing, and shipping, to determine compliance with this specification. Each

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generating set will be inspected to see that it is constructed, finished, and packed in accordance with the requirements set forth in this specification.

F-2. *Tests.*—The complete equipment shall be given such operating and other tests as may be necessary to assure compliance with these specifications, including the tests described herein. When tests are made at the factory, the contractor shall furnish all the necessary facilities and testing instruments therefor without expense to the contracting office. The contractor shall also furnish such information as may be necessary to determine whether or not the materials used are as specified. The manufacturer shall be held responsible for any defects in material or workmanship which are of such a nature that they could not be detected by careful inspection or tests.

F-2a. *Voltage regulation test.*—The set shall be operated at full load until the generator temperature becomes approximately constant. From full load, the load shall gradually reduce to no load, taking voltage readings at full load, three-fourths load, one-half load, one-fourth load, and no load.

F-2b. *Limited operating test.*—The set shall be operated at full load for one continuous period of not less than two hours after warm-up is complete. During this test the set shall operate without excessive heating or wear of any part. Each set shall be given the voltage regulation test and the limited operating test.

## G. PACKING AND MARKING.

### G-1. *Packing.*—

G-1a. All parts, liable to rust, shall be thoroughly slushed with a rust-preventing grease.

G-1b. For domestic shipment, the unit shall be packed in accordance with the best commercial practice in order to assure safe delivery. For export shipment, when required, it will be enclosed in wood containers, conforming to standard practice for export shipment.

G-2. *Marking.*—The marking for shipment shall be in accordance with the best commercial practice, and in accordance with instructions which accompany official order.

## H. NOTES.

H-1. *Information, cuts, descriptions, etc.*—The bidder is required to submit full catalog cuts, descriptions, drawings, diagrams, and all details concerning the equipment he intends to furnish under the proposal. Lack of such information will constitute an insufficient bid and will be disregarded by the contracting officer in consideration for award. Telegraphic bids will not be considered.

H-2. *Questions, comments.*—All questions or comments arising from the contents of this specification or proposal shall be submitted at least 5 days before the date set for the opening of bids, or consideration cannot be given them.



# SPECIFICATIONS, TYPE 2

## A. APPLICABLE SPECIFICATIONS.

A-1. The specifications enumerated below of the issue in effect on the date of the Invitation for Bids are made a part of this specification.

American Standards for Rotating Electrical Machinery.

Electrical Safety Code for Electrical Installations and Wiring.

## B. TYPE.

B-1. This specification covers a semiautomatic controlled, permanently mounted, gasoline engine driven, alternating current, electric generating set, mounted on a rigid base or chassis, for installation on concrete foundation.

## C. MATERIALS AND WORKMANSHIP.

C-1. *Materials.*—The materials for each part of the set shall be as specified herein. All parts subject to corrosion in a damp, salt, tropical climate shall be suitable to withstand corrosion or suitably protected from corrosion. Where a definite material is not specified, the material used shall be of the best quality normally used for the purpose in good commercial practice.

C-2. *Workmanship.*—All parts of the generating set and controls shall be manufactured and finished in a thoroughly workmanlike manner. All dimensions shall be held as close as is consistent with good shop practice.

*Gasoline driven electric generating set, 60 cycles alternating current, semiautomatic, frequency regulation for teletype, or other systems requiring frequency regulations*

## D. GENERAL REQUIREMENTS.

D-1. There are no general requirements applicable to this specification.

## E. DETAIL REQUIREMENTS.

E-1. *General.*—The set shall consist of a gasoline engine, direct-connected to an alternating current generator; a built-in or direct-connected exciter; a switch gear for semiautomatic and manual operation, control, and protection of the set; a rigid metal base, tools, accessories, spare parts, instruction books, etc., all as described herein. The complete set shall be permanently mounted on a common subbase provided with proper holes, bolts, bushings, etc., for installation on concrete foundation. The general design shall be such as to produce a workmanlike, practical and satisfactory machine without the use of unproven devices. The equipment is intended for emergency standby operation and the design will be such that a nontechnical operator can, with a period of special training of not more than 1 week in duration, operate the generating set without difficulty in the dark. The set is intended to provide electric power primarily for *teletype systems*, with possible additions of electric lighting and powering of small electric motors. Such additional loads shall not comprise more than 10 percent of the total rated capacity of the generating set.

E-2. *Capacity.*—The set shall be capable of delivering continuously, at an engine speed of not to exceed 1,800 revolutions per minute an output not less than that specified in the table of sizes for type 2, in paragraph E-3, for the size required in the accompanying proposal.

E-3. Table of sizes for type 2.

Size	Kilowatt rating (capacity)	Rated voltage	Intermittent overload 1 hour (percent), minimum	Engine horsepower delivered to generator shaft, minimum	Number of cylinders, minimum	Maximum piston speed
						<i>Ft./min.</i>
A	1.5	110	20.0	5.0	2	825
B	3.0	110	20.0	7.0	2	825
C	5.0	110	20.0	14.0	4	850
D	7.5	110	25.0	18.0	4	900
E	10.0	110	25.0	24.0	4	1,150
F	15.0	110	25.0	38.0	6	1,150

E-4. *Engine.*—The gasoline engine shall be of a water-cooled, four-stroke cycle, vertical or V type, having the number of cylinders, horsepower delivered to the generator shaft, and piston speed, as specified in E-3, table of sizes for type 2. Operating speed shall not exceed 1,800 revolutions per minute. All power requirements as defined by this specification shall be obtained with ordinary standard, straight (unblended) gasoline, not exceeding 68 octane. The power requirements are based on standard conditions of sea level with atmospheric pressure of 14.7 pounds per square inch and ambient temperature of 60° F. The engine shall be of a standard commercial design that has proved satisfactory in extensive generating set use, and shall be one

for which spare parts are readily obtainable throughout the United States. Lubrication of engines having plain bearing crankshaft and camshaft shall be by means of either the force-feed and splash type, or force-feed type with gear-driven oil pump, and so arranged that lubrication will be maintained under all conditions of service. Lubrication of engines equipped with antifriction bearing camshaft and crankshaft may be by means of the constant level or splash type. Magneto ignition shall be provided and the entire ignition system must be shielded effectively to prevent radio interference. The engine shall be equipped with a suitable gasoline filter, a mechanical fuel pump with flexible fuel line lead, and a mechanical governor which shall control the speed as elsewhere specified herein. The muffler shall be of the high-



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est grade and shall effectively silence exhaust noise. Suitable fittings shall be provided to make proper connections from exhaust manifold to remote exhaust outlet and 15 feet of flexible exhaust tubing shall be supplied for connection thereto. The carburetor shall be equipped with suitable air filter and back-fire trap with provisions made to trap or drain all excess fuel which might drip from carburetor bowl under conditions of over-choking. The carburetor, fuel pump and all other similar parts shall be constructed of corrosion resisting materials suitable to withstand a damp, salt, tropical climate, or otherwise protected against corrosion by suitable means such as plating, enameling, etc. The complete engine unit including radiator and accessories shall be so arranged that all parts are readily accessible.

**E-4a. Starting.**—The unit shall be provided with controls, such that a semiautomatic start may be accomplished at any moment when normal supply is shut off. At the moment of power-line failure, an automatic transfer switch shall open its initial connection with the power line, connect the demand circuit with the alternating-current output of the electric generator and set into operation the cranking circuit of the starting system on the engine. A safety switch shall be provided in the cranking circuit such that electric cranking will cease after approximately 10 seconds if the engine fails to start. A manual reset shall be incorporated in the safety switch to permit further operation. Any proposed control system shall be of a proven type and full description of same, together with proof of unfailing reliability *must* be submitted with the bid at the time of opening. Provision for manual starting of the unit shall be made in case battery condition is too low to permit cranking electrically. Cranking may be accomplished by means of the generator exciter or automotive accessory type. Provision shall be made for recharging of the starting battery. Starting voltage shall not be less than 12 volts and batteries for starting shall consist of a pair of 6-volt units, connected in series. An automatic choke shall be provided. The path of the hand crank shall be unobstructed.

**E-4b. Cooling system.**—The engine shall be equipped with a suitable type cooling system, including radiator of ample size, ventilating fan of the pusher type, and water pump—if required. Thermal-syphon systems are allowed. The system shall provide sufficient cooling capacity to keep the engine at a temperature which will insure economical and satisfactory operation when powering the generator under full rated load and with a maximum circulating water temperature of not more than 100° F. above an ambient temperature of 100° F. The engine block and radiator shall be provided with suitable water drains. A suitable protective grille shall be provided for the radiator.

**E-4c. Fuel tank.**—A fuel tank shall be provided, having a capacity of at least 55 gallons, and shall be suitable for underground installation. It shall be arranged for either gravity or pump feed to the engine, and shall be located not more than 15 feet away from the generating plant, horizontally, or not more than 6 feet below the level of the fuel pump on the engine. All necessary fittings shall be provided and shall include suitable filler pipe and cap, vent pipe, supply outlet fittings, 25 feet of copper fuel line tubing, line water trap with fittings, etc. Fuel tank shall be treated inside with a protective coating of nonmetallic material suitable to reduce corrosion from effects of water and from such corrosive elements as may occur in standard grades of gasoline. The tank shall be coated on the exterior in a commercially acceptable manner for protection against corrosion due to contact with the damp earth.

**E-5. Generator.**—A 60-cycle single-phase, alternating current, continuous rating, semienclosed, self-ventilated generator as defined by the American Standards for Rotating Electrical Machinery shall be provided. The generator shall have a rated full load capacity as specified in E-2 and in E-3 (Table of sizes). The generator shall fulfill this capacity requirement under full service conditions including the heating effects obtained with the entire equipment assembled for operation. The exciter shall be either built-in or direct-connected to the generator shaft. All coil and winding insulation shall conform with class B insulation as defined by the American Standards for Rotating Electrical Machinery and all temperature measurements and tests shall be in accordance with American Standards for the type of equipment supplied. The coils and windings shall be thoroughly treated with an oil and water resisting insulation compound. At intervals following successive applications of compound or varnish, the coils shall be thoroughly baked. The whole machine shall be insulated and protected for continuous operation in a damp, salt, tropical atmosphere and provision shall be made to prevent failure of insulation due to condensation of moisture upon metallic parts. The terminal leads from the generator shall be brought through the frame, with suitable insulating bushings. The generator shaft shall be provided with antifriction bearing or bearings.

**E-5a. Overload.**—The generator shall operate satisfactorily in all particulars at loads up to and including full rated load plus overload as stated in table (E-3) at unity power factor without objectionable noise, vibration or heating. It shall be capable of delivering full rated load plus overload at unity power factor continuously for at least 1 hour and withstand a dead short circuit across the terminals for 5 seconds without injury.

**E-6. Voltage and frequency.**—Voltage regulation shall be accomplished by inherent regulation contained in the generator and exciter, and by the addition of an approved external regulating device. The external regulating device shall operate automatically to maintain the specified regulation without hunting. A proven and reliable voltage regulator, similar and equal to and interchangeable with, Westinghouse silverstat regulator shall be furnished and of a type that can be easily mounted on the panel board of the plant. Regulators of the carbon pile, vibrating contact type, or regulators that have not been in similar service with satisfactory performance for 2 years prior to the issuance of this specification, will not be acceptable. Failure of any part of the voltage regulator shall not cause the exciter shunt field to become inactive in function. The governor of the engine, the windings of the generator and exciter, and the voltage regulator shall be so designed and adjusted that regardless of the temperature (within the limits specified for operation elsewhere herein) of either the engine, generator or exciter, the following frequency and voltage regulation shall be maintained.

1. **Frequency.**—At all loads between no load cold and rated full load hot (at all ambient temperatures within the operating range specified elsewhere herein) the frequency must be within the range of 59 to 61 cycles. No variations outside these limits are permitted. At any selected steady load the frequency shall not vary more than 0.5 cycle.

2. **Voltage.**—The generator must be capable of being adjusted to deliver rated full load amperes at any voltage selected between 220 and 240 or 110 and 120 volts and maintain the voltage regulation specified below at any of such adjustments. With adjustments made for the generator to deliver rated full load amperes cold at a selected voltage, the actual delivered voltage at any load (such load to be at a power factor between 80 and



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100 percent) between no load cold and rated full load amperes hot must be within a range of 98 to 102 percent of the selected full-load cold voltage except that momentary fluctuations outside the limits of this range are permitted as follows:

(1) Rise to 103 or drop to 97 percent of the selected full-load cold voltage when the existing load is suddenly varied by an amount not exceeding 10 percent of the generator-rated amperes.

(2) Rise to 112 or drop to 88 percent of the selected full load cold voltage when the existing load is suddenly varied by an amount between 11 and 50 percent of the generator-rated amperes.

(3) Rise to 125 or drop to 75 percent of the selected full-load cold voltage when the existing load is suddenly varied by an amount between 51 and 100 percent of the generator-rated amperes.

It is to be understood that the above-mentioned momentary voltage variation requirements do not apply if the load resulting from the sudden load variation exceeds the rated full load amperes of the generator, and if the power factor of the increment load or resulting load is not between 80 and 100 percent.

At any steady load, the voltage, in addition to being within the range specified above, shall be constant to the extent that the needle of the switchboard voltmeter shall not pulsate and to the extent that a recording of such voltage by an Esterline recording voltmeter shall be practically a straight line free from any sharp fluctuations.

The wave form of the output voltage shall be nearly sinusoidal, having a total harmonic distortion not exceeding 10 percent at any load from zero to rated output when a pure resistance load is being fed. (*Note.*—The contractor is cautioned that the necessary testing equipment must be on hand to measure this distortion at the time of inspection. A string oscillograph with photographic attachment is considered necessary to make this test. The photographic attachment must be capable of photographing a zero line for the wave being photographed. The Fischer-Hinnen method shall be used to calculate distortion of the wave form.)

**E-6a. Control.**—The set shall be arranged for manual control, in addition to the semiautomatic control circuit. Provision shall be made through necessary switches so that by a simple change of switch positions a manual start by means of hand cranking or push-buttons may be made. Provision shall be made for manual stopping of the engine at any time by means of push-button or toggle-switch control, without a tendency for battery cranking to set in. All necessary controls for semiautomatic operation must be supplied.

**E-7. Switchboard.**—A substantially constructed switchboard panel, of impregnated, homogeneous, ebony asbestos, compound, or other similarly suitable material, with all instruments and other devices suitably mounted thereon, shall be supplied. The instruments shall consist of one voltmeter with scale of 0-150 volts alternating current; one ammeter with scale of sufficient spread to indicate at least 130 percent of rated amperage, and one zero center direct current ammeter to indicate the charging rate to the battery. One main circuit breaker with overload protection shall also be conveniently mounted upon the panel. A rheostat control for battery charge-rate adjustment shall be provided. The instruments shall be furnished complete with all fuses, shunts, etc., necessary for their proper operation. Each instrument and device on the panel shall be identified by stamped designation plates, stenciled with paint, or suitable identification on the

particular piece of equipment. The complete switchboard panel shall be arranged for most convenient installation near the generating unit for wall mounting or on pipe standards. A wiring diagram, showing all electrical circuits as well as identification of all terminals shall be provided, whether painted on the face of the panel, or mounted in a suitable unexposed part of the panel or control boxes, and protected by suitable covering or clear shellac.

**E-8. Wiring.**—All wiring and other current carrying parts shall be proportioned so that no undue heating will occur when the set is operated under the most severe conditions. Connections shall be secured so as to prevent contact with the frame or moving parts and resist movement under stress of normal vibration. All wiring shall be in accordance with the latest edition of the Electrical Safety Code for Electrical Installations and Wiring.

**E-9. Base.**—The generating unit shall be mounted on a substantial subbase or chassis of cast iron or pressed steel, unless an oversized oil sump base is provided for this purpose. In case of the latter construction, all sections of such base shall be of generous size and proportion, designed particularly for the purpose, and not a conversion of base type oil pan for gasoline engine, as such. The base shall be extended a sufficient distance to the rear so as to provide ample footing for the balance of the complete assembly. Shock-resisting bushings, or other type of vibration dampening shall be provided with the unit so that ample cushioning may be established between unit and concrete base.

**E-10. Finish.**—The machine shall be finished in accordance with the best commercial practice. All exposed parts and surfaces shall be properly primed and given two coats of best grade machinery enamel.

**E-11. Name plates.**—The engine and generator shall be provided with manufacturer's name plates bearing the serial numbers, dates, and name of the manufacturer, together with all other pertinent information usually furnished. Identification plates shall be attached to each of the boxes containing automatic control devices.

**E-12. Tools, accessories, spare parts, etc.**—

**E-12a.** All tools, accessories, and spare parts necessary for the operation and maintenance of the generating set shall be supplied. Tools and spare parts shall include the following:

### Tools

Set of standard open end wrenches for all removable nuts, caps, and plugs.  
Set of special wrenches, extensions, spanners and accessories required for removal and maintenance of all parts. One oil can.

### Spare parts

Set spark plugs.  
Set intake valves.  
Set exhaust valves.  
Set valve springs.  
Set valve keys.  
Set cork and copper gaskets.  
Set ignition breaker points.  
Set water hoses.  
Set hose clamps.  
One distributor cap.  
Two fan belts.  
One oil filter removal cartridge.  
One flexible fuel line connection.



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## Electric spares

One set generator brushes.  
One set generator brush springs.  
Ten fuses of each kind and capacity used on the set.

A set is the amount required for one engine or one generator. All tools and accessories shall be of the best quality and shall be acceptable to the contracting agent. All spare parts shall be furnished by the manufacturer of the original equipment and shall be interchangeable therewith.

**E-13. Container.**—A container of wood or metal, provided with a 1½-inch padlock complying with Federal Specification No. FF-P-101, type VI-A, with two duplicate keys, shall be provided for the tools, spare parts, accessories, and instruction books. The container shall be arranged with suitable compartments to secure and protect the parts in a manner so as to be readily accessible. A holder shall be provided for an oil can in an accessible position.

**E-14. Instruction books.**—The contractor shall furnish for each generating plant four copies of a complete instruction book covering the assemblage, description of operation, adjustment, maintenance, and replacement of parts. This manual shall include a wiring diagram and a detailed parts list having pictures or drawings with part numbers for each part of the generating set. The manual shall also include a complete description of the measures that must be taken in order to operate the set at temperatures as low as -10° F. The instructions and parts lists shall be distributed as follows:

Two copies packed with each generating plant.

Two copies mailed direct to the contracting agent.

**E-15. Standard products.**—The equipment supplied under this specification shall be new and unused and shall be essentially standard products of the manufacturers; shall be the manufacturer's latest approved designs, and shall be in regular production in order that prompt and continuing service and delivery of parts may be guaranteed.

**E-16. Ruggedness.**—The equipment to be furnished under this specification shall have demonstrated by extensive satisfactory commercial use the ruggedness essential not only for employment under the type of service for which it is herein intended, but also to withstand shock of usual means of transportation. The contracting agent may require the bidder to show evidence of the extensive satisfactory commercial use of the equipment he proposes to furnish.

**E-17. Guaranty.**—All materials and workmanship shall be of the highest grade and shall be free from any defects or imperfections. Any defect clearly due to the faulty design or to faulty material or workmanship, which may develop within 1 year after completion of the contract, unless otherwise specified, shall be made good by and at the expense of the contractor. Corrections or replacements required because of faulty design, etc., shall be made within the continental limits of the United States by the contractor, at his expense and at the convenience of the contracting agency, at the plant of the manufacturer.

## F. METHOD OF INSPECTION AND TEST.

**F-1. Inspection.**—The contractor shall, at all working hours permit the entrance of representatives

or inspectors of the contracting agent, who shall have the right to follow the material through all the processes of manufacture, tests, packing, and shipping, to determine compliance with this specification. Each generating set shall be inspected to see that it is constructed, finished, and packed in accordance with the requirements set forth in this specification.

**F-2. Tests.**—The complete equipment shall be given such operating and other tests as may be necessary to assure compliance with these specifications and including the tests described herein. When tests are made at the factory, the contractor shall furnish all the necessary facilities and testing instruments therefor without expense to the contracting office. The contractor shall also furnish such information as may be necessary to determine whether or not the materials used are as specified. The manufacturer shall be held responsible for any defects in material or workmanship which are of such a nature that they could not be detected by careful inspection or tests.

**F-2a. Voltage regulation test.**—The set shall be operated at full load until the generator temperature becomes approximately constant. From full load, the load shall gradually reduce to no load, taking voltage readings at full load, three-quarter load, one-half load, one-quarter load, and no load. All other such tests as may be necessary to determine full compliance with paragraph E-6 requirements shall be made.

**F-2b. Limited operating test.**—The set shall be operated at full load for one continuous period of not less than 2 hours after warm-up is complete. During this test the set shall operate without excessive heating or wear of any part. Each set shall be given the voltage regulation test and the limited operating test.

## G. PACKING AND MARKING.

### G-1. Packing.

**G-1a.** All parts, liable to rust, shall be thoroughly slushed with a rust-preventing grease.

**G-1b.** For domestic shipment, the unit shall be packed in accordance with the best commercial practice in order to assure safe delivery. For export shipment, when required, it shall be enclosed in wood containers, conforming to the standard practice for export shipment.

**G-2. Marking.**—The marking for shipment shall be in accordance with the best commercial practice, and in accordance with instructions which accompany the official order.

## H. NOTES.

**H-1. Information, cuts, descriptions, etc.**—The bidder is required to submit full catalog cuts, descriptions, drawings, diagrams, and all details concerning the equipment he intends to furnish under the proposal. Lack of such information will constitute an insufficient bid and will be disregarded by the contracting officer in consideration for award. Telegraphic bids will not be considered.

**H-2. Questions, comments.**—All questions or comments arising from the contents of this specification or proposal shall be submitted at least 5 days before the date set for the opening of bids, or consideration cannot be given them.

# SPECIFICATIONS, TYPE 3

*Diesel driven electric generating set, 60 cycles alternating current, semiautomatic, nonfrequency regulation for use in case of power failure.*

## A. APPLICABLE SPECIFICATIONS.

A-1. The specifications enumerated below of the issue in effect on the date of the Invitation for Bids are made a part of this specification.

American Standards for Rotating Electrical Machinery.

Electrical Safety Code for Electrical Installations and Wiring.

## B. TYPE.

B-1. This specification covers a semiautomatic controlled, permanently mounted, Diesel engine driven, a. c., electric generating set, mounted on rigid base for installation on a concrete foundation.

## C. MATERIALS AND WORKMANSHIP.

C-1. *Materials.*—The materials for each part of the set shall be as specified herein. All parts subject to corrosion in a damp, salt, tropical climate shall be suitable to withstand corrosion or suitably protected from corrosion. When a definite material is not specified, the material used shall be of the best quality normally used for the purpose in good commercial practice.

C-2. *Workmanship.*—All parts of the generating set and controls shall be manufactured and finished in a thoroughly workmanlike manner. All dimensions shall be held as close as is consistent with good shop practice.

## D. GENERAL REQUIREMENTS.

D-1. There are no general requirements applicable to this specification.

## E. DETAIL REQUIREMENTS.

E-1. *General.*—The set shall consist of a Diesel engine, direct connected to an alternating current generator; a built-in or direct-connected exciter; a switchgear for automatic and manual operation, control, and protection of the set; a rigid metal base; tools, accessories, spare parts, instruction books, etc., as described herein. The complete set shall be permanently mounted on a common subbase provided with proper holes, bolts, bushings, etc., for installation on a concrete foundation. The general design shall be such as to produce a workmanlike, practical, and satisfactory machine without the use of unproven devices. The equipment is intended for emergency stand-by operation and the design shall be such that an average nontechnical operator can, with a period of special training of not more than 1 week duration, operate the generator set without difficulty in the dark. The set is intended to provide electric power for lighting and for power, including electric motors, where the power factor of such load will vary from unity to 0.8 (approximately).

E-2. *Capacity.*—The set shall be capable of delivering continuously, at an engine speed of not to exceed 1,200 revolutions per minute, not less than that specified in table, paragraph E-3, at 110-220 volts, alternating current, with frequency of 60 cycles.

E-3. Table of sizes for type 3.

Size	Kilowatt rating	Rated voltage	Frequency control from 60 cycles (maximum variation)	Intermittent overload (1 percent) 1 hour (minimum)	Number of cylinders, engine (minimum)	Maximum piston speed	Engine horsepower delivered to generator shaft (minimum)
						<i>Ft./min.</i>	
a.....	12.0	110/220	±2	20.0	4	900	36
b.....	20.0	110/220	±2	20.0	6	900	48
c.....	32.0	110/220	±2	20.0	6	1,050	78
d.....	50.0	110/220	±2	20.0	6	1,200	118

E-4. *Engine.*—The Diesel engine shall be of a water-cooled, vertical type, having the number of cylinders, horsepower delivered to the generator shaft, and rated speed, as specified in E-3, table of sizes for type 3. All power requirements as defined by this specification shall be obtained with ordinary standard fuel which shall consist of a neutral distillate petroleum fuel oil, characteristics of which are defined elsewhere herein. The power requirements are based on standard conditions of sea level with atmospheric pressure at 14.7 pounds per square inch and ambient temperature of 60° F. The engine shall be of a standard commercial design that has proven satisfactory in extensive generating set use, and shall be one for which spare parts are readily obtainable throughout the United States. Positive cold starting shall be readily accomplished by means of electric and manual cranking. The combustion chambers, valves, ports, nozzles, etc., shall be so arranged and designed as to produce high

combustion efficiency, clean exhaust, and long hours of service between servicing of injection system. Crankcase and cylinders shall be of cast iron, with removable dry type sleeves of special alloy to resist high heat and wear. Pistons shall be of suitable material, heat-treated, and equipped with at least five piston rings. The engine lubrication system shall be of the full pressure type and shall consist mainly of positive gear type pump with pressure regulation which shall lift oil from a large capacity oil base through drilled or cast passages to all main, connecting rod, and camshaft bearings, and to water pump drive shaft, valve rocker arms, wrist pins, and to timing and idler gears. Lubrication of the cylinder walls may be by means of splash from connecting rods and main bearings. An oil viscosity indicator shall be furnished to indicate the condition of the lubricating oil. Fuel filter of the dual type shall be provided so that all foreign material may be removed before fuel enters the high pressure pump. High pressure



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pump and injection nozzles shall be of highest grade obtainable from domestic manufacture and shall be of a type which may be serviced at many points within the United States. Nozzles shall be of the nonlogging type. A suitable governor shall be mounted on the engine capable of controlling speed to within 5 percent total variation from no load to full load. The muffler shall be of a type consistent with the size of the engine and shall effectively silence the exhaust noise. Suitable fittings and connections shall be supplied with the muffler so that installation may be made to carry exhaust fumes a distance of 15 feet from the generating unit. All parts and materials shall be of such material or coated in such a manner as to protect against corrosion in damp, salt, tropical atmosphere. The complete engine unit, including cooling radiator and accessories, shall be so arranged as to be readily accessible.

**E-4a. Starting.**—The unit shall be provided with controls such that a semiautomatic start may be accomplished at any moment when power supply is shut off. Any system of controls which may be proposed by the bidder should be adequately described in detail. Wiring diagrams with complete description of operation should accompany bid in time for opening. Unfailing reliability is of utmost importance and proof of successful operation of the system proposed is required. No unproven systems will be considered. The entire unit shall be provided with all accessories, such as starting motor, battery charging facility, and all relays, switches, etc., which may be necessary for complete operation. The path of the hand crank shall be unobstructed.

**E-4b. Cooling system.**—The engine shall be equipped with a suitable type cooling system, including radiator of ample size, ventilating fan of the pusher type, and water pump. The system shall provide sufficient cooling capacity to keep the engine at a temperature which will insure economical and satisfactory operation when operating the power generator continuously under full rated load, and with a maximum circulating water temperature of not more than 100° F. above an ambient temperature of 100° F. The engine block and radiator shall be provided with suitable water drains. A suitable protective grille shall be provided for the radiator.

**E-4c. Fuel tank.**—A fuel tank shall be provided having a capacity of 100 gallons and shall be suitable for underground installation. It shall be arranged for pump feed to the engine, and will be located not more than 15 feet from the generator, or not more than 6 feet below the level of the fuel pump on the engine. All necessary fittings shall be provided and shall include suitable filler pipe and cap, vent pipe, supply outlet fittings, line water trap and fittings, etc. Fuel tank shall be treated inside with a protective coating of non-metallic material suitable to reduce corrosion from the effects of water and from such corrosive elements as may occur in standard grades of fuel. The tank shall be coated on the exterior in a commercially acceptable manner to protect from corrosions due to contact with the damp earth.

**E-4d. Fuel.**—The generating unit shall be capable of satisfactory operation when a neutral distillate petroleum fuel oil of the following characteristics is used:

1. Viscosity at 100° F.----- 35 seconds, minimum.  
(Saybolt Universal)  
(preferably 40 to  
70)----- 100 seconds, maximum.
2. Sulphur (by weight)----- 2.0 percent, maximum.
3. Conradson carbon----- 0.2 percent, maximum.

4. Ash content----- 0.02 percent, maximum.
5. Moisture and Sediment  
(BS&W) by volume-- 0.05 percent, maximum.
6. Flash----- 150° F.
7. Pour point at least as low  
as----- -20° F.
8. Ignition and burning  
qualities to be equal  
to No. 1-D:  
Cetane number, min-  
imum----- 50.  
Diesel index number,  
minimum----- 45.  
Viscosity-gravity num-  
ber, maximum----- 0.86.  
Boiling point gravity  
number, maximum----- 188.

**E-5. Generator.**—A 60-cycle, single-phase, three-wire, alternating-current generator as defined by the American Standards for Rotating Electrical Machinery shall be provided. The generator shall have a rated full-load capacity as specified in paragraphs E-2 and E-3. The generator shall fulfill this capacity requirement under full service conditions including the heating effects obtained with the entire equipment assembled for operation. The exciter shall be either built-in or direct-connected to the generator shaft. All coil and winding insulation shall conform with class B insulation as defined by American Standards for Rotating Electrical Machinery, and all temperature measurements and tests will be in accordance with American Standards for the type of equipment supplied. The coils and windings shall be thoroughly treated with an oil and water-resisting insulating compound. At intervals following successive applications of compound or varnish, the coils shall be thoroughly baked. The whole machine shall be insulated and protected for continuous operation in a damp, salt, tropical atmosphere and provision shall be made to prevent failure of insulation due to condensation of moisture upon metallic parts. The terminal leads from the generator shall be brought through the frame with suitable insulating bushings. The generator shaft shall be provided with antifriction bearing or bearings.

**E-5a. Overload.**—The generator shall operate satisfactorily in all particulars at loads up to and including 120 percent of full-load rating at unity power factor without objectionable noise, vibration, or heating. It shall be capable of developing 120 percent of full-load rating at unity power factor continuously for at least one hour and on a dead short circuit across the terminals for 5 seconds without injury.

**E-5b. Voltage regulation.**—The generator voltage at unity power factor shall not vary more than 12 percent of full-load voltage at all points between no load and full load, when the generating set is completely assembled and operating under normal conditions. The voltage regulation shall be inherent, that is, obtained without the use of separate voltage regulation devices.

**E-6. Control.**—The set shall be arranged for manual control, in addition to the semiautomatic control circuit. Provision shall be made through necessary switches so that by a simple change of switch positions, manual start by means of hand-cranking may be made. Provision shall be made for manual stopping of the engine at any time without a tendency for battery cranking to set in. All necessary controls for semiautomatic operation must be supplied.

**E-7. Switchboard.**—A substantially constructed switchboard panel of impregnated, homogeneous, ebony asbestos compound or other similarly suitable material



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with all instruments and other devices suitably mounted thereon, shall be supplied. The instruments shall include one alternating-current voltmeter, 0-300 volts; two alternating-current ammeters scaled to include overload, oil pressure gage, water temperature gage, and ammeter to show battery charging rate. One main circuit breaker with overload protection shall also be conveniently mounted upon the panel. The instruments shall be furnished complete with all fuses, shunts, etc., necessary for their proper operation. All other devices necessary for indication or control of the set shall be conveniently arranged. Each instrument and device on the panel shall be identified by stamped designation plates, stenciled with paint, or suitable identification on the particular piece of equipment. The complete switchboard panel should be arranged for most convenient installation near the generating unit, whether arranged for wall mounting, or in pipe standards. A wiring diagram showing all electrical circuits as well as identification of all terminals shall be provided, whether painted on the face of the panel, or mounted in a suitable unexposed part of the panel or control boxes, and protected by suitable covering or clear shellac.

E-8. *Wiring*.—All wiring and other current-carrying parts shall be proportioned so that no undue heating will occur when the set is operated under the most severe conditions. Connections shall be so secured as to prevent contact with the frame or moving parts and resist movement under stress of normal vibration. All wiring shall be in accordance with the latest edition of the Electrical Safety Code for Electrical Installations and Wiring.

E-9. *Base*.—The generating unit shall be mounted upon a substantial subbase of cast iron or pressed steel. Base shall be extended a sufficient distance so as to provide ample footing for balance of complete assembly. Shock-resisting bushings, or other type of vibration dampening shall be provided with the unit so that ample cushioning may be established between unit and concrete base.

E-10. *Finish*.—The machine shall be finished in accordance with best commercial practice. All exposed parts shall be properly primed and given two coats of best grade machinery enamel.

E-11. *Nameplates*.—The engine and generator shall be provided with manufacturer's nameplates bearing the serial numbers, dates and names of the manufacturer, together with all other pertinent information usually furnished. Identification plates shall be attached to each of the boxes containing the automatic control devices.

E-12. *Tools, accessories, spare parts, etc.*

E-12a. All tools, accessories and spare parts necessary for the operation and maintenance of the generating set shall be supplied. Tools and spare parts shall include the following:

### *Tools*

Set of standard open-end wrenches for all removable nuts, caps, and plugs.

Set of special wrenches, extensions, spanners and accessories required for removal and maintenance of all parts.

Hammer, screw driver, pliers, adjustable pipe-wrench (small), adjustable open-end wrench (small), adjustable open-end wrench (large).

### *Spare parts*

Oil-filter cartridge.

Two fan belts.

Set of water hoses and clamps.

Piston, wrist pin, connecting-rod assembly, with bearings.

Set engine gaskets, complete.

Set of valves, complete (engine).

Standard set replacements for injector system.

### *Electric spares*

One set generator brushes (each kind).

One set generator brush springs (each kind).

Ten fuses of each kind and capacity used on the set.

A set is the amount required for one engine or one generator. All tools and accessories shall be of best quality and shall be acceptable to the contracting agent. All spare parts shall be furnished by the manufacturer of the original equipment and shall be interchangeable therewith.

E-13. *A container* of wood or metal, provided with a 1½ inch padlock complying with Federal Specification No. FF-P-101, type VI-A, with two duplicate keys, shall be provided for the tools, spare parts, accessories, and instruction books. The container shall be arranged with suitable compartments to secure and protect the parts in a manner so as to be readily accessible. A holder shall be provided for an oil can in an accessible position.

E-14. *Instruction books*.—The contractor shall furnish for each generating plant 4 copies of a complete instruction book covering the assemblage, description, operation, adjustment, maintenance, and replacement of parts. This manual shall include a wiring diagram and a detailed parts list having pictures or drawings with part numbers for each part of the generating set. The manual shall also include a complete description of the measures that must be taken in order to operate the set at temperatures as low as -10° F. The instructions and parts lists shall be distributed as follows:

Two copies packed with each generating set.

Two copies mailed direct to the contracting agent.

E-15. *Standard products*.—The equipment supplied under this specification shall be new and unused and shall be essentially standard products of the manufacturers; shall be the manufacturers' latest approved designs and shall be in regular production in order that prompt and continuing service and delivery of parts may be guaranteed.

E-16. *Ruggedness*.—The equipment to be furnished under this specification shall have demonstrated by extensive satisfactory commercial use the ruggedness essential not only for employment under the type of service for which it is herein intended, but to also withstand shock of usual means of transportation. The contracting agent may require bidder to show evidence of the extensive satisfactory commercial use of the equipment he proposes to furnish.

E-17. *Guaranty*.—All materials and workmanship shall be of the highest grade and shall be free from any defects or imperfections. Any defect clearly due to faulty design or to faulty material or workmanship, which may develop within 1 year after completion of the contract, unless otherwise specified, shall be made good by and at the expense of the contractor. Corrections or replacements required because of faulty design, etc., shall be made within the continental limits of the United States by the contractor, at his expense, and at the convenience of the purchaser, at the plant of the manufacturer.

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## F. METHOD OF INSPECTION AND TEST.

F-1. The contractor shall, at all working hours, permit the entrance of representatives or inspectors of the contracting agent, who shall have the right to follow the material through all the processes of manufacture, tests, packing and shipping, to determine compliance with this specification. Each generating set will be inspected to see that it is constructed, finished, and packed in accordance with the requirements set forth in this specification.

F-2. *Tests.*—The complete equipment will be given such operating and other tests as may be necessary to assure compliance with these specifications, including the tests described herein. When tests are made at the factory, the contractor shall furnish all the necessary facilities and testing instruments therefor, without expense to the contracting office. The contractor shall also furnish such information as may be necessary to determine whether or not the materials used are as specified. The manufacturer shall be held responsible for any defects in material or workmanship which are of such a nature that they could not be detected by careful inspection or tests.

F-2a. *Voltage and frequency regulation test.*—The set shall be operated at full load until the generator temperature becomes approximately constant. From full load, the load will be gradually reduced to no load, taking voltage and frequency readings at full load, three-fourths load, one-half load, one-fourth load, and no load.

F-2b. *Limited operating test.*—The set shall be operated at full load for one continuous period of not less than 2 hours after warm-up is complete. During

this test the set shall operate without excessive heating or wear of any part. Each set shall be given the voltage and frequency-regulation test and the limited operating test.

## G. PACKING AND MARKING.

### G-1. *Packing.*

G-1a. All parts, liable to rust, shall be thoroughly slushed with a rust-preventing grease.

G-1b. For domestic shipment, the unit shall be packed in accordance with commercial practice in order to assure safe delivery. For export shipment, when required, it will be enclosed in wood containers, conforming to standard practice for export shipment.

G-2. *Marking.*—The marking for shipment shall be in accordance with the best commercial practice, and in accordance with instructions which accompany official order.

## H. NOTES.

H-1. *Information, cuts, descriptions, etc.*—The bidder is required to submit catalog cuts, descriptions, drawings, diagrams, and all details concerning the equipment he intends to furnish under this proposal. Lack of such information will constitute an insufficient bid and will be disregarded by the contracting officer in consideration for award. Telegraphic bids will not be considered.

H-2. *Questions, comments.*—All questions or comments arising from the contents of this specification or proposal shall be submitted by at least 5 days before the date set for the opening of bids, or consideration cannot be given them.



# SPECIFICATIONS, TYPE 4

## A. APPLICABLE SPECIFICATIONS.

A-1. The specifications enumerated below, of the issue in effect on the date of the Invitation for Bids, are made a part of this specification.

American Standards for Rotating Electrical Machinery.

Electrical Safety Code for Electrical Installations and Wiring.

## B. TYPE.

B-1. This specification covers a semiautomatic controlled, permanently mounted, Diesel-engine-driven, alternating-current electric generating set, mounted on a rigid base for installation on a concrete foundation.

## C. MATERIALS AND WORKMANSHIP.

C-1. *Materials.*—The materials for each part of the set shall be as specified herein. All parts subject to corrosion in a damp, salt, tropical climate shall be suitable to withstand corrosion or suitably protected from corrosion. Where a definite material is not specified, the material used shall be of the best quality normally used for the purpose in good commercial practice.

C-2. *Workmanship.*—All parts of the generating set and controls shall be manufactured and finished in a thoroughly workmanlike manner. All dimensions shall be held as close as is consistent with good shop practice.

*Diesel-driven electric generating set, 60 cycles alternating current, semi-automatic frequency regulation for teletype, or other systems requiring frequency regulations*

## D. GENERAL REQUIREMENTS.

D-1. There are no general requirements applicable to this specification.

## E. DETAIL REQUIREMENTS.

E-1. *General.*—The set shall consist of a Diesel engine, direct connected to an alternating current generator; a built-in or direct-connected exciter; a switchgear for automatic and manual operation, control, and protection of the set; a rigid metal base; tools, accessories, spare parts, instruction books, etc., all as described herein. The complete set shall be permanently mounted on a common subbase provided with proper holes, bolts, bushings, etc., for installation on a concrete foundation. The general design shall be such as to produce a workmanlike, practical, and satisfactory machine without the use of unproven devices. The equipment is intended for emergency stand-by operation and the design shall be such that an average non-technical operator can, with a period of special training of not more than 1 week duration, operate the generator set without difficulty in the dark. The set is intended to provide electric power primarily for *teletype systems*, with possible additions of electric lighting and powering of small electric motors. Such additional loads shall not comprise more than 10 percent of the total rated capacity of the generating set.

E-2. *Capacity.*—The set shall be capable of delivering continuously at an engine speed of not to exceed 1,200 revolutions per minute, an output not less than that specified in the Table of sizes for type 4 (par. E-3), at 110–220 volts, alternating current, 60 cycles, unity power factor.

E-3. Table of sizes for type 4.

Size	Kilowatt rating	Rated voltage	Frequency control from 60 cycles (maximum variation)	Intermittent overload (percent) 1 hour (minimum)	Number of cylinders, engine (minimum)	Maximum piston speed	Engine horsepower delivered to generator shaft (minimum)
						<i>Ft./min.</i>	
a	12	110/220	±2	25	4	900	36
b	20	110/220	±2	30	6	900	48
c	32	110/220	±2	30	6	1,050	78
d	50	110/220	±2	20	6	1,200	118

E-4. *Engine.*—The Diesel engine shall be of a water-cooled, vertical type, having the number of cylinders, horsepower delivered to the generator shaft, and rated speed, as specified in E-3, table of sizes for type 4. All power requirements, as defined by this specification shall be obtained with an ordinary standard fuel which shall consist of a neutral distillate petroleum fuel oil, characteristics of which are defined elsewhere herein. The power requirements are based on standard conditions of sea level with atmospheric pressure at 14.7 pounds per square inch, and ambient temperature of 60° F. The engine shall be of a standard commercial design that has proved satisfactory in extensive generating set use and shall be one for which spare parts are readily obtainable throughout the United States. Positive cold starting shall be readily accomplished by

means of electric and manual cranking. The combustion chambers, valves, ports, nozzles, etc., shall be so arranged and designed as to produce high-combustion efficiency, clean exhaust, and long hours of service between servicing of the injection system. Crankcase and cylinders shall be of cast iron, with removable dry-type sleeves of special alloy to resist high heat and wear. Pistons shall be of suitable material and heat-treated, equipped with at least five piston rings. The engine lubrication system shall be of the full pressure type and shall consist mainly of positive gear type pump with pressure regulation which shall lift oil from a large capacity oil base through drilled or cast passages to all main, connecting rod, and camshaft bearings, and to water pump drive shaft, valve rocker arms, wrist pins, and to timing and idler gears. Lubrication of the



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cylinder walls may be by means of splash from connecting rods and main bearings. An oil viscosity indicator shall be furnished to indicate the condition of the lubricating oil. Fuel filter of the dual type shall be provided so that all foreign material may be removed before fuel enters the high-pressure pump. High-pressure pump and injection nozzles shall be of the highest grade obtainable from domestic manufacture and shall be of a type which may be serviced at many points within the United States. Nozzles shall be of the nonclogging type. A suitable governor shall be mounted on the engine capable of controlling speed as elsewhere specified herein. The muffler shall be of a type consistent with the size of the engine and shall effectively silence the exhaust noise. Suitable fittings and connections shall be supplied with the muffler so that installation may be made to carry exhaust fumes a distance of 15 feet from the generating unit. All parts and materials shall be of such material or coated in such a manner as to protect against corrosion in damp, salt, tropical atmosphere. The complete engine unit, including a cooling radiator and accessories shall be so arranged as to be readily accessible.

**E-4a. Starting.**—The unit shall be provided with controls such that a semiautomatic start may be accomplished at any moment when power supply is shut off. Any system of controls which may be proposed by the bidder should be adequately described in detail. Wiring diagrams with complete description of operation should accompany the bid in time for opening. Unfailing reliability is of utmost importance and proof of the successful operation of the system proposed is required. No unproved systems will be considered. The entire unit shall be provided with all accessories, such as starting motor, battery-charging facility, and all relays, switches, etc., which may be necessary for complete operation. The path of the hand crank shall be unobstructed.

**E-4b. Cooling system.**—The engine shall be equipped with a suitable type cooling system, including radiator of ample size, ventilating fan of the pusher type, and water pump. The system shall provide sufficient cooling capacity to keep the engine at a temperature which will insure economical and satisfactory operation when operating the power generator continuously under full rated load, and with a maximum circulating water temperature of not more than 100° F. above an ambient temperature of 100° F. The engine block and radiator shall be provided with suitable water drains. A suitable protective grille shall be provided for the radiator.

**E-4c. Fuel tank.**—A fuel tank shall be provided, having a capacity of 100 gallons and suitable for underground installation. It shall be arranged for pump feed to the engine, and shall be located not more than 15 feet from the generator or not more than 6 feet below the level of the fuel pump on the engine. All necessary fittings shall be provided and shall include suitable filler pipe and cap, vent pipe, supply outlet fittings, line water trap, and fittings, etc. The fuel tank shall be treated inside with a protective coating of a nonmetallic material suitable to reduce corrosion from effects of water and from such corrosive elements as may occur in standard grades of fuel. The tank shall be coated on the exterior in a commercially acceptable manner for protection against corrosion due to contact with the damp earth.

**E-4d. Fuel.**—The generating unit shall be capable of satisfactory operation when a neutral distillate petroleum fuel oil of the following characteristics is used:

1. Viscosity at 100° F.--- 35 seconds, minimum.  
(Saybolt Universal) 100 seconds, maximum.  
(preferably 40 to 70).
2. Sulfur (by weight)---- 2 percent, maximum.
3. Conradson carbon----- 0.2 percent, maximum.
4. Ash content----- 0.2 percent, maximum.
5. Moisture and sediment 0.05 percent, maximum.  
(B.S.&W.) by volume.
6. Flash----- 150° F.
7. Pour point at least as low as----- -20° F.
8. Ignition and burning qualities to be equal to No. 1-D:  
Cetane No., minimum----- 50.  
Diesel Index No., minimum----- 45.  
Viscosity, gravity No., maximum--- 0.86.  
Boiling point gravity No., maximum. 188.

**E-5. Generator.**—A 60-cycle, single-phase, three-wire, alternating-current generator as defined by the American Standards for Rotating Electrical Machinery shall be provided. The generator shall have a rated full load capacity as specified in paragraphs E-2 and E-3. The generator shall fulfill this capacity requirement under full service conditions including the heating effects obtained with the entire equipment assembled for operation. The exciter shall be either built-in or direct-connected to the generator shaft. All coil and winding insulation shall conform with class B insulation as defined by American Standards for Rotating Electrical Machinery and all temperature measurements and tests will be in accordance with American Standards for the type of equipment supplied. The coils and windings shall be thoroughly treated with an oil and water-resisting insulating compound. At intervals following successive applications of a compound or varnish, the coils shall be thoroughly baked. The whole machine shall be insulated and protected for continuous operation in a damp, salt, tropical atmosphere and provisions shall be made to prevent failure of insulation due to condensation of moisture upon metallic parts. The terminal leads from the generator shall be brought through the frame with suitable insulating bushings. The generator shaft shall be provided with antifriction bearing or bearings.

**E-5a. Overload.**—The generator shall operate satisfactorily in all particulars at loads up to and including 120 percent of full load rating at unity power factor without objectionable noise, vibration, or heating. It shall be capable of developing 120 percent of full load rating at unity power factor continuously for at least 1 hour and on a dead short circuit across the terminals for 5 seconds without injury.

**E-6. Voltage and frequency.**—Voltage regulation shall be accomplished by inherent regulation contained in the generator and exciter, and by the addition of an approved external regulating device. The external regulating device shall operate automatically to maintain the specified regulation without hunting. A proved and reliable voltage regulator similar and equal to and interchangeable with, Westinghouse Silverstat Regulator shall be furnished and shall be of a type that can be easily mounted on the panel board of the plant. Regulators of the carbon pile, vibrating contact type, or



regulators that have not been in similar service with satisfactory performance for 2 years prior to the issuance of this specification, will not be acceptable. Failure of any part of the voltage regulator shall not cause the exciter shunt field to become inactive in function. The governor of the engine, the windings of the generator and exciter, and the voltage regulator shall be so designed and adjusted that regardless of the temperature (within the limits specified for operation elsewhere herein) of either the engine, generator or exciter, the following frequency and voltage regulation shall be maintained.

1. **Frequency.**—At all loads between no load cold and rated full load hot (at all ambient temperatures within the operating range specified elsewhere herein) the frequency must be within the range of 59 to 61 cycles. No variations outside these limits are permitted. At any selected steady load, frequency shall not vary more than 0.5 cycle.

2. **Voltage.**—Generator must be capable of being adjusted to deliver rated full load amperes at any voltage selected between 220 and 240 or 110 and 120 volts and maintain the voltage regulation specified below at any of such adjustments. With adjustments made for the generator to deliver rated full load amperes cold at a selected voltage, the actual delivered voltage at any load (such load to be at power factor between 80 and 100 percent) between no load cold and rated full load amperes hot must be within a range of 98 to 102 percent of the selected full load cold voltage except that momentary fluctuations outside the limits of this range are permitted as follows:

(1) Rise to 103 or drop to 97 percent of the selected full load cold voltage when the existing load is suddenly varied by an amount not exceeding 10 percent of the generator-rated amperes.

(2) Rise to 112 or drop to 88 percent of the selected full load cold voltage when the existing load is suddenly varied by an amount between 11 and 50 percent of the generator-rated amperes.

(3) Rise to 125 or drop to 75 percent of the selected full load cold voltage when the existing load is suddenly varied by an amount between 51 and 100 percent of the generator-rated amperes.

It is to be understood that the above-mentioned momentary voltage variation requirements do not apply if the load resulting from the sudden load variation exceeds the rated full load amperes of the generator, and if the power factor of the increment load or resulting load is not between 80 and 100 percent.

At any steady load, the voltage, in addition to being within the range specified above, shall be constant to the extent that the needle of the switchboard voltmeter shall not pulsate and to the extent that a recording of such voltage by an Esterline recording voltmeter shall be practically a straight line free from any sharp fluctuations.

The wave form of the output voltage shall be nearly sinusoidal, having a total harmonic distortion not exceeding 10 percent at any load from zero to rated output when a pure resistance load is being fed.

(NOTE.—The contractor is cautioned that the necessary testing equipment must be on hand to measure this distortion at time of inspection. A string oscillograph with photographic attachment is considered necessary to make this test. The photographic attachment must be capable of photographing a zero line for the wave being photographed. The Fischer-Hinnen method will be used to calculate distortion of the wave form).

E-6a. **Control.**—The set shall be arranged for manual control, in addition to the semiautomatic control circuit. Provision shall be made through

necessary switches so that by a simple change of switch positions manual starting may be made by means of hand-cranking. Provision shall be made for manual stopping of the engine at any time without a tendency for battery cranking to set in. All necessary controls for semiautomatic operation must be supplied.

E-7. **Switchboard.**—A substantially constructed switchboard panel of impregnated, homogeneous, ebony asbestos compound or other similarly suitable material with all instruments and other devices suitably mounted thereon, shall be supplied. The instruments shall include one alternating current voltmeter, 0-300 volts, two alternating current ammeters scaled to include overload, oil pressure gage, water temperature gage, and ammeter to show battery charging rate. One main circuit breaker with overload protection shall also be conveniently mounted upon the panel. The instruments shall be furnished complete with all fuses, shunts, etc., necessary for their proper operation. All other devices necessary for indication or control of the set shall be conveniently arranged. Each instrument and device on the panel shall be identified by stamped designation plates, stenciled with paint, or suitable identification on the particular piece of equipment. The complete switchboard panel should be arranged for most convenient installation near the generating unit, whether arranged for wall mounting, or on pipe standards. A wiring diagram showing all electrical circuits as well as identification of all terminals shall be provided, whether painted on the face of the panel, or mounted in a suitable unexposed part of the panel or control boxes, and protected by a suitable covering or clear shellac.

E-8. **Wiring.**—All wiring and other current carrying parts shall be proportioned so that no undue heating will occur when the set is operated under the most severe conditions. Connections shall be so secured as to prevent contact with the frame or moving parts and resist movement under stress of normal vibration. All wiring shall be in accordance with the latest edition of the Electrical Safety Code for Electrical Installations and Wiring.

E-9. **Base.**—The generating unit shall be mounted upon a substantial subbase of cast iron or pressed steel. Base shall be extended a sufficient distance so as to provide ample footing for balance of complete assembly. Shock resisting bushings, or other type of vibration dampening, shall be provided with the unit so that ample cushioning may be established between the unit and the concrete base.

E-10. **Finish.**—The machine shall be finished in accordance with the best commercial practice. All exposed parts shall be properly primed and given two coats of best grade machinery enamel.

E-11. **Nameplates.**—The engine and generator shall be provided with manufacturer's nameplates bearing the serial numbers, dates, and names of the manufacturer, together with all other pertinent information usually furnished. Identification plates shall be attached to each of the boxes containing the automatic control devices.

E-12. **Tools, accessories, spare parts, etc.**—

E-12a. All tools, accessories, and spare parts necessary for the operation and maintenance of the generating set shall be supplied. Tools and spare parts shall include the following:

## Tools

Set of standard open end wrenches for all removable nuts, caps and plugs.

Set of special wrenches, extensions, spanners, and accessories required for removal and maintenance of all parts.



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Hammer, screw driver, pliers, adjustable pipe-wrench (small), adjustable open end wrench (small), adjustable open end wrench (large).

## Spare parts

Oil filter cartridge.

Two fan belts.

Set of water hoses and clamps.

Piston, wristpin, connecting rod assembly, with bearings.

Set engine gaskets, complete.

Set of valves, complete (engine).

Standard set replacements for injector system.

## Electric spares

One set generator brushes (each kind).

One set generator brush springs (each kind).

Ten fuses of each kind and capacity used on the set.

A set is the amount required for one engine or one generator. All tools and accessories shall be of the best quality and shall be acceptable to the contracting agent. All spare parts shall be furnished by the manufacturer of the original equipment and shall be interchangeable therewith.

E-13. *A container* of wood or metal, provided with a 1½-inch padlock complying with Federal Specification No. FF-P-101, type VI-A, with two duplicate keys, shall be provided for the tools, spare parts, accessories, and instruction books. The container shall be arranged with suitable compartments to secure and protect the parts in a manner as to be readily accessible. A holder shall be provided for an oil can in an accessible position.

E-14. *Instruction books*.—The contractor shall furnish for each generating plant four copies of a complete instruction book covering the assemblage, description, operation, adjustment, maintenance and replacement of parts. This manual shall include a wiring diagram and a detailed parts list having pictures or drawings with part numbers for each part of the generating set. The manual shall also include a complete description of the measures that must be taken in order to operate the set at temperatures as low as -10° F. The instructions and parts lists shall be distributed as follows:

Two copies packed with each generating set.

Two copies mailed direct to the contracting agent.

E-15. *Standard products*.—The equipment supplied under this specification shall be new and unused and shall be essentially standard products of the manufacturers; shall be the manufacturers' latest approved designs, and shall be in regular production in order that prompt and continuing service and delivery of parts may be guaranteed.

E-16. *Ruggedness*.—The equipment to be furnished under this specification shall have demonstrated by extensive satisfactory commercial use the ruggedness essential not only for employment under the type of service for which it is herein intended, but also to withstand shock of usual means of transportation. The contracting agent may require the bidder to show evidence of the extensive satisfactory commercial use of the equipment he proposes to furnish.

E-17. *Guaranty*.—All materials and workmanship shall be of the highest grade and shall be free from any defects or imperfections. Any defect clearly due to faulty design or to faulty material or workmanship, which may develop within 1 year after completion of the contract, unless otherwise specified, shall be made good by and at the expense of the contractor. Corrections or replacements required because of faulty design

etc., shall be made within the continental limits of the United States by the contractor, at his expense, and at the convenience of the purchaser, at the plant of the manufacturer.

## F. METHOD OF INSPECTION AND TEST.

F-1. *Inspection*.—The contractor shall permit the entrance of representatives or inspectors of the contracting agent, who shall have the right to follow the material through all the processes of manufacture, tests, packing, and shipping, to determine compliance with this specification. Each generating set shall be inspected to see that it is constructed, finished, and packed in accordance with the requirements set forth in this specification.

F-2. *Tests*.—The complete equipment will be given such operating and other tests as may be necessary to assure compliance with these specifications, including the tests described herein. When tests are made at the factory, the contractor shall furnish all the necessary facilities and testing instruments therefor, without expense to the contracting office. The contractor shall also furnish such information as may be necessary to determine whether or not the materials used are as specified. The manufacturer shall be held responsible for any defects in material or workmanship which are of such a nature that they could not be detected by careful inspection or tests.

F-2a. *Voltage and frequency regulation test*.—The set shall be operated at full load until the generator temperature becomes approximately constant. From full load, the load will be gradually reduced to no load, taking voltage and frequency readings at full load, three-fourths load, one-half load, one-fourth load, and no load.

F-2b. *Limited operating test*.—The set shall be operated at full load for one continuous period of not less than 2 hours after warm-up is complete. During this test the set shall operate without excessive heating or wear of any part. Each set shall be given the voltage and frequency regulation test and the limited operating test.

## G. PACKING AND MARKING.

### G-1. Packing.

G-1a. All parts, liable to rust, shall be thoroughly slushed with a rust-preventing grease.

G-1b. For domestic shipment, the unit shall be packed in accordance with commercial practice in order to assure safe delivery. For export shipment, when required, it will be enclosed in wood containers, conforming to standard practice for export shipment.

G-2. *Marking*.—The marking for shipment shall be in accordance with the best commercial practice, and in accordance with instructions which accompany official order.

## H. NOTES.

H-1. *Information, cuts, descriptions, etc.*—The bidder is required to submit full catalog cuts, descriptions, drawings, diagrams, and all details concerning the equipment he intends to furnish under this proposal. Lack of such information will constitute an insufficient bid and will be disregarded by the contracting officer in consideration for award. Telegraphic bids will not be considered.

H-2. *Questions, comments*.—All questions or comments arising from the contents of this specification or proposal shall be submitted by at least 5 days before the date set for the opening of bids, or consideration cannot be given them.



# SPECIFICATIONS, TYPE 5

## Portable electric generating set, 60 cycles alternating current

### A. APPLICABLE SPECIFICATIONS.

A-1. *Specifications.*—The specifications enumerated below of the issue in effect on the date of the Invitation for Bids are made a part of this specification.

American Standards for Rotating Electrical Machinery.

Electrical Safety Code for Electrical Installations and Wiring.

### B. TYPE.

B-1. This specification covers various sizes of portable type, gasoline-engine driven, alternating current, electric generating sets.

### C. MATERIALS AND WORKMANSHIP.

C-1. *Materials.*—The materials for each part of the equipment shall be as specified herein. Where a definite material is not specified, the materials used shall be of the best quality normally used for the purpose in good commercial practice.

C-2. *Workmanship.*—All parts of the generating set shall be manufactured and finished in a thoroughly workmanlike manner. All dimensions shall be held as close as is consistent with good shop practice.

### D. GENERAL REQUIREMENTS.

D-1. *General.*—The set shall consist of an air or water-cooled gasoline engine, as specified in paragraph D-2a for the size and type required, the engine to be directly connected to an alternating current generator, complete in all detail including tools, accessories, spare parts, instruction books, etc., all as described herein. The general design shall be such as to produce a workmanlike, practical and workable machine without the use of unproven devices. The equipment is intended for emergency, portable operations and its design shall be such that an average nontechnical operator can operate the set without difficulty. The unit shall be compact and arranged so as to afford maximum portability.

D-2. *Capacity.*—The generating set shall be capable of delivering the designated power continuously at 110 volts, alternating current, 60 cycles, and at unity power factor. The capacity of the generating set shall be as specified in the invitation to bid according to size designation as listed in table for sizes, paragraph D-2a.

D-2a.

Size	Kilowatt rating	Over-load 1 hour minimum	Frequency regulation from 60 cycles, maximum (deviation)	Engine horsepower delivered to generator shaft, minimum	Rated speed revolutions per minute, maximum	Number of cylinders engine, minimum	Piston speed engine, maximum	Method of cooling engine	Type of mounting assembly	Housed or open type	Type of panel or switch board required	Overall weight (dry) (maximum)
		Percent					<i>Ft./min.</i>					<i>Pounds</i>
A	0.35	20.0	±1.5	1.0	1,800	1	700	Air	Skid	Open	A	95
B	.50	20.0	±1.5	1.7	1,800	1	830	do	do	do	A	150
C	.75	20.0	±1.5	2.0	1,800	1	830	do	do	do	A	165
D	1.0	20.0	±1.5	2.5	1,800	1	830	do	do	do	A	170
E	1.5	20.0	±1.5	3.0	1,800	2	830	do	do	do	A	145
E-1	1.5	20.0	±1.5	4.0	1,800	1	830	Water	do	Housed	B	310
F	2.0	20.0	±1.5	5.0	1,800	2	830	do	do	do	B	570
G	3.0	20.0	±1.5	7.0	1,800	2	830	do	do	do	B	575
H	5.0	20.0	±1.5	14.0	1,800	4	830	do	do	do	B	W40
H-1	5.0	20.0	±1.5	16.0	1,200	4	830	do	do	do	B	1,375
I	7.5	20.0	±1.5	22.0	1,800	4	1,150	do	do	do	B	1,380
J	10.0	20.0	±1.5	24.5	1,800	4	1,150	do	do	do	B	1,450

D-3. *Engine.*—The gasoline engine shall be of a four-cycle type, having the number of cylinders, capable of satisfactorily operating the generator continuously at full rated load at maximum rated speed, as designated in paragraph D-2a, for the size required, and shall have sufficient surplus capacity for operation at designated overload for a period of at least 1 hour without overheating or detonation. All power requirements as defined by this specification shall be obtained with ordinary standard (straight) unblended gasoline of 68 octane. The engine shall be of a standard commercial design that has proved satisfactory in generating set use and shall be one for which spare parts are readily obtainable throughout the United States. A high-tension magneto, impulse coupling (sizes H-1 through J) and distributor shall be provided. The magneto shall be suitably insulated with sufficient high-grade baked varnish to withstand a damp, salt, tropical climate. The engine shall be equipped with a suitable

gasoline filter, a mechanical governor to control speed within 5 percent, a mechanical fuel pump (if required) and an effective type muffler. The governor shall control the speed to within 5 percent from no load to full load. The carburetor shall be equipped with a suitable air filter. The carburetor, fuel pump, and all other similar parts or accessories shall be constructed of corrosion-resisting materials suitable to withstand damp, salt, tropical climate, or otherwise protected against corrosion by suitable means such as plating, or enameling, etc. The complete engine unit shall be so arranged that all parts are readily accessible. A suitable fuel tank having a capacity for at least 4 hours operation of the set at full-rated load shall be provided and conveniently mounted as part of the unit. It shall be arranged for either gravity or pump feed to the engine. The tank shall be provided with a suitable filler cap, protected vent and all necessary connections to the engine.

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**D-3a. Cooling.**—Water-cooled engines shall be provided with a cooling system including radiator, fan, etc., capable of keeping the engine at a temperature which will insure economical and satisfactory operation when operating the power generator continuously under full rated loads and with a maximum circulating water temperature rise of not more than 100° F. over an ambient temperature of 100° F. The engine block and radiator shall be provided with suitable water drains. A suitable protective grille shall be provided for the radiator.

**D-3b. Cooling.**—Air-cooled engines shall be so designed that adequate cooling is accomplished throughout the maximum output range. A cooling blower shall be integral with the engine and provide an ample supply of cooling air to all cooling surfaces such that no overheating effects will be obtained. At 120 percent of full load, no seizing, detonation, pre-ignition or other similar conditions shall be noticeable after 1 hour of operation on standard grades of gasoline fuel of 68 octane rating, at an ambient temperature of 100° F. and at sea-level atmospheric pressure.

**D-4. Generator.**—A 60-cycle, single-phase, alternating-current, continuous rating, self-ventilated, splash-proof generator as defined by American Standards for Rotating Electrical Machinery shall be provided. The generator shall have a rated full load capacity as designated in the Table of sizes for type 5 (D-2a) which is a part of this specification. This capacity requirement is under full service conditions including the heating effects obtained with the entire equipment assembled for operation. All coil and winding insulation shall conform with class B insulation as defined by American Standards Association and all temperature measurement tests shall be made in accordance with said standards for the type of equipment supplied. The coils and windings shall be thoroughly treated with an oil and water resisting insulating compound. At intervals following successive applications of compounds of varnish, the coils shall be thoroughly baked. The whole machine shall be insulated and protected for continuous operation in a damp, salt, tropical atmosphere, and provision shall be made to prevent failure of insulation due to condensation of moisture upon metallic parts. The terminal leads from the generator shall be brought through the frame with suitable insulating bushings. The generator shaft shall be provided with antifriction bearing or bearings.

**D-4a. Overload.**—The generator shall operate satisfactorily in all particulars at all loads up to and including 120 percent of rated full load without objectionable noise vibration or heating. It shall be capable of operating at 20 percent overload continuously for at least 1 hour and on a dead short-circuit across the terminals for 30 seconds without injury.

**D-4b. Voltage regulation.**—The generator voltage at unity power factor shall not vary more than 13 percent of full-load voltage at all points between no load and full load, when the generating set is completely assembled and operating under normal conditions. The voltage regulation shall be inherent, that is, obtained without the use of separate regulating devices.

**D-4c. Frequency regulation.**—The generator output frequency shall not exceed 1.5 cycles variation from 60 cycles at any point between no load and full rated load and the average frequency change shall not be more than 0.5 cycle for a given change in load of 10 percent of full load rating between no load and full load.

**D-5a. Control and switchgear.**—All units or sizes of the open type shall be started by means of a rope or hand crank and arranged for manual control. The engine shall be started manually by hand cranking and stopped by short-circuiting the magneto by means of a suitable push-button switch. A small panel shall be conveniently mounted on the set and shall contain the stop-button, 0-150 volt alternating current voltmeter, and a pair of twist-lock receptacles. Receptacles shall contain a suitable cap or plug for subsequent use with extension cord. The above-described control and switchgear shall be known as type A, as shown in table D-2a.

**D-5b. Control and switchgear.**—All units or sizes of the housed or closed type shall be arranged for manual starting with magneto ignition by means of a hand crank or rope. The engine shall be stopped by short-circuiting the magneto by means of a suitable push-button switch. A suitable ammeter, voltmeter, circuit-breaker, water-temperature indicator, gasoline gage, oil-pressure gage, stop-push-button, main power terminals and outlet for trouble or service light shall be provided and mounted upon a suitably insulated panel. The instrument panel shall be arranged within the sheet-metal housing in such a manner as to be readily accessible to the operator, and shall be enclosed and protected from the elements of weather. A carburetor choke control shall be convenient to the hand crank location. This control shall be known as type B as shown in table D-2a.

**D-6. Wiring.**—All wiring and other current-carrying parts shall be proportioned so that no undue heating will occur when the set is operated under the most severe conditions. Connections shall be so secured as to prevent contact with the frame or moving parts. All wiring shall be in accordance with the latest edition of the Electrical Safety Code for Electrical Installation and Wiring.

**D-7. Mounting and housing.**—All units shall be mounted on suitable skids for portable field service. Units of the open type (without housing) shall be provided with conveniently located carrying handles, so arranged that when the unit is transported by means of these handles, no undue tipping or condition of unbalance will exist. The enclosed units (housed) shall be in metal housings which shall have adequate ventilation to prevent the engine and generator from overheating when operating. Metal carrying handles which telescope or fold so as to be out of the way when the set is operating, shall be provided. The number of handles to be furnished are dependent upon the weight of the generating set, that is, a sufficient number of handles shall be furnished so that the set may be easily carried.

**D-8. Finish.**—The machine shall be finished in accordance with best commercial practice. All exposed parts shall be properly primed and given two coats of high-grade machinery enamel.

**D-9. Nameplates.**—The engine and generator shall be provided with manufacturers' nameplates bearing the serial numbers, dates, and names of the manufacturers, together with all other pertinent information usually furnished.

**D-10. Tools, accessories, spare parts and container.**—

**D-10a.** All tools, accessories and spare parts necessary for the operation and maintenance of the generating set shall be supplied. Tools, accessories, and spare parts shall include the following:



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## Tools

Hammer.  
Screwdriver.  
Pliers.  
Set of standard fixed open end wrenches for all removable nuts, caps and plugs.  
Set of special wrenches, extensions, spanners and accessories required for removal and maintenance of all parts.

## Accessories

Engine crank or rope as required for manual start.  
Oil can.  
Funnel for filling fuel tank.

## Engine spares

Set piston rings (one complete replacement).  
Set spark plugs.  
Set intake valves.  
Set exhaust valves.  
Set valve springs.  
Set valve keys.  
Set cork and copper gaskets.  
Magneto interrupter.  
Connecting rod with bearings.  
Two fan belts (if used).

## Electric spares

One set generator brushes (each type used).

A set is the amount required for one engine or for one generator. All tools and accessories shall be of good quality, acceptable to the contracting agent. All spare parts shall be furnished by the manufacturers of the original equipment.

D-10b. *Container*.—A container of wood or metal, provided with a 1½-inch padlock complying with Federal Specification No. FF-P-101, type VI-A, with two duplicate keys, shall be provided for the tools, spare parts, accessories, and instruction books. The container shall be arranged with suitable compartments to secure and protect the parts in a manner so as to be readily accessible. A holder shall be provided for the oil can in an accessible position.

D-11. *Instruction books*.—The contractor shall furnish for each generating set two copies of a complete instruction book covering the assemblage, description, operation, wiring diagram, lubrication, adjustment, maintenance, and replacement of parts. This manual shall include a detailed parts and price list having pictures with parts numbers for each part of the complete unit. Photographs or drawings of the general assembly of the generating set shall be provided. The manual shall include a complete description of the measures that must be taken when operating the generating set at temperatures as low as -10° F. The instruction book, parts lists, etc., shall be bound together in a suitable cover to form one complete volume. Both copies of the instruction book shall be boxed for shipment with the set, unless otherwise specified by the contracting agent.

D-12. *Standard products*.—The equipment supplied under this specification shall be new and unused and shall be essentially standard products of the manufacturers; shall be the manufacturers' latest approved designs, and shall be in regular production in order that prompt and continuing service and delivery of parts may be guaranteed.

D-13. *Ruggedness*.—The equipment to be furnished under this specification shall have demonstrated by extensive satisfactory use the ruggedness essential not only for employment under the extreme conditions encountered in the field but also to withstand transportation in a truck over rough country roads at speeds up to 25 miles an hour. The contracting agent may require the bidder to show evidence of the extensive satisfactory commercial use of the equipment he proposes to furnish.

D-14. *Guarantee*.—All materials and workmanship shall be of the highest grade and shall be free from any defects or imperfections. Any defect clearly due to faulty design or to faulty workmanship or material, which may develop within one year after completion of the contract, unless otherwise specified, shall be made good by and at the expense of the contractor.

## E. DETAIL REQUIREMENTS.

E-1. *Engines*.—The gasoline engine shall conform to paragraphs D-3 and D-3a, and shall deliver the power designated in Table D-2a for the sizes required. Horsepower, as designated in table D-2a, is net horsepower, available for transmission directly to the generator shaft at the rated revolutions per minute. The bidder shall be required to show proof that the engine he proposes to furnish for the size required is capable of such output.

E-2. The generators shall conform to paragraph D-5 and shall have nominal rated capacities as indicated in table D-2a, for the size and type required.

E-3. *Weight*.—The complete generating set, exclusive of tools, accessories, spare parts, etc., shall not exceed the weights as designated in Table of sizes (D-2a) for the size or type required. Weights given in Table of sizes are dry weights for the complete equipment, ready to operate.

## F. METHODS OF INSPECTION AND TEST.

F-1. *Inspection*.—The contractor shall at all working hours permit the entrance of representatives or inspectors of the contracting agent, who shall have the right to follow the material through all the processes of manufacture, tests, packing, and shipping to determine compliance with this specification. Every facility, including suitable office space and equipment, shall be given the inspectors for the proper execution of their work. The contractor shall make, at his own expense, and previous to test by the contracting agent, or his representatives, sufficient tests to insure that the units conform to the specifications in all respects. Each generating set will be inspected to see that it is constructed, finished, and packed in accordance with the requirements set forth in this specification.

F-2. *Tests*.—The complete equipment will be given such operating and other tests as may be necessary to assure compliance with these specifications, including the tests described herein. When tests are made at the factory, the contractor shall furnish all the necessary facilities therefor without expense to the contracting agency. The contractor shall also furnish such information as may be necessary to determine whether or not the materials used are as specified. The manufacturers shall be held responsible for any defects in material and workmanship which are of such a nature that they could not be detected by careful inspection or tests.

F-2a. *Voltage and frequency regulation test*.—The set shall be operated at full load until the generator



## Municipal Signaling Systems

temperature becomes approximately constant. From full load the load will be gradually decreased to no load, taking voltage and frequency readings at full load, three-fourth load, one-half load, one-fourth load, and no load.

F-2b. The set shall be operated at full load for 4 hours. During this test the set shall operate without excessive heating or wear of any part. This 4-hour period may be a part of the run-in period, at the discretion of the manufacturer.

### G-1. *Packing.*—

G-1a. All parts liable to rust shall be thoroughly slushed with a rust-preventing grease.

G-1b. For domestic shipment, the unit shall be packed in accordance with commercial practice in order to insure safe delivery. For export shipment, when required, it will be enclosed in wood containers, conforming to best commercial practice.

G-2. *Marking.*—The marking for shipment shall be in accordance with the usual commercial practice, or as specifically mentioned in purchase order.

## H. NOTES.

H-1. *Information, cuts, descriptions, etc.*—The bidder is required to submit full catalog cuts, descriptions, drawings, diagrams, and all details concerning the equipment he intends to furnish under the proposal. Lack of such information will constitute an insufficient bid and will be disregarded by the contracting officer in consideration for award. Telegraphic bids will not be considered.

H-2. *Questions and comments.*—All questions or comments arising from the contents of this specification or proposal shall be submitted by at least 5 days before the date set for the opening of bids, or consideration cannot be given them.







# PROTECTION OF INDUSTRIAL PLANTS AND PUBLIC BUILDINGS



***United States Office of Civilian Defense  
Washington, D. C.***



# FOREWORD

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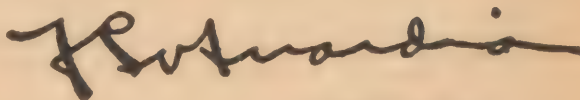
## ***Office of Civilian Defense Washington, D. C.***

This publication is issued by the Office of Civilian Defense to assist executives of public and private undertakings in the protection of personnel and physical plants under their jurisdiction. Among the undertakings to be protected are industrial plants, factories, schools, hospitals, business establishments, and public buildings.

It is expected that the general plan outlined in this publication will be adapted by plant managers or local civilian defense authorities to meet local conditions or special needs. Plans should be kept as simple as possible because experience shows that such plans work best in practice.

Success in the protection of plants and public buildings depends largely upon the thought, preparation, and training done NOW. Plans must be worked out carefully. Personnel with suitable qualifications must be selected for key positions and for the various other tasks involved. Individual training, followed by collective training, is necessary. All personnel should be organized and trained as soon as possible.

This plan provides for a squad for every possible casualty. In small establishments, squads may have more than one duty provided such duties are not inconsistent.



F. H. LaGUARDIA,  
*U. S. Director Civilian Defense.*

WASHINGTON, D. C.  
*August 14, 1941.*



# PROTECTION OF INDUSTRIAL PLANTS

## ***General Considerations***

EVEN though the possibility of enemy air attack upon industrial plants and public buildings in the United States may be remote, it is essential that protective organization be developed at once to guard against the disruption of normal activities and for the safety of the personnel in an emergency. The general plan outlined in the following pages is to provide for the security of every employee and for the maintenance of production at the highest possible rate.

Protective measures should recognize that the effect of a bomb is local. The damage is therefore less when operations are decentralized, dispersed, and duplicated among many small plants or buildings. So far as is economically possible, such arrangements should be made. Similarly, each plant should be prepared to protect itself, independently of outside assistance.

It is recognized, however, that arrangements for exchange of information and mutual assistance should be made between plant managers and local governmental authorities, including the local defense council or agency. Local authorities should rely upon plant services for aid if necessary.

## ***Protective Organization***

The protective organization in each industrial plant, business establishment, or public building should consist of a Plant Defense Coordinator and four heads of divisions. The divisions are fire, police, medical, and maintenance services.

In the office of the Plant Defense Coordinator, provision should be made for communication with the civil air raid warning system, control of transportation facilities, and liaison with local governmental authorities.

The Plant Defense Coordinator is responsible for developing a communication system within the plant to permit the immediate transmission of messages between the Coordinator and squads organized under the various divisions, and between squads. The report center under the Plant Defense Coordinator should have a system of reports from each squad and from each key position so that the Coordinator will know when his plant is "manned and ready." Check-off lists should be developed and be on hand. A distinctive signal, such as a gong, rapidly beaten triangle, or other percussion sound, should be arranged to indicate a gas attack.

Since telephones may become overloaded or out of order, arrangements must be made for emergency methods of communication, such as runners and cyclists.

All transportation equipment should be allotted by and under the control of the headquarters of the Plant Defense Coordinator.

The Plant Defense Coordinator should be a clear-thinking individual capable of taking charge of action in an emergency. He should be able to get things done without friction or loss of time. This Plant Defense Coordinator has full responsibility for preparing plans, organizing and equipping squads, and training personnel. During an emergency he has control of the dispatch of all squads.

The heads of divisions should be well qualified in their respective fields of work. They should also be capable of managing men and of taking charge of unusual incidents.

# AND PUBLIC BUILDINGS

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Within each division, squads should be organized to render the particular service for which the division is responsible. Usually a squad will consist of 4 or 5 individuals or as many as the Plant Defense Coordinator believes is necessary. So far as possible, individual employees should be assigned to the type of protective work for which they are best suited.

The training of personnel should provide first for the training of individuals, then of squads. Thereafter, the entire organization should be trained collectively to insure the fullest degree of teamwork, cooperation, and usefulness.

In small plants, the protective organization may be even simpler than that just described. However, provision must be made for all aspects of protection.

## ***Fire Services***

The Plant Fire Chief should be the head of the fire-fighting forces. He will be responsible for the fire-fighting brigade and for the equipment, both heavy and portable, permanent and temporary. An inspection and survey should be made immediately and all precautions taken, such as the removal of old equipment and rubbish from roof spaces. Access to the roof should be provided. The adequacy and availability of water supply, both main and auxiliary, should be studied. All men assigned to the fire brigade should be taught the latest methods of fighting fires and dealing with incendiary bombs.

Fire-watcher squads should be organized, equipped, and trained. Their duties will be to watch for, locate, and handle incendiary bombs so as to prevent a small flame from becoming a conflagration. Normally, fire-watcher squads will handle incendiaries but they should be prepared to call for assistance. The Appendix lists the equipment needed by a fire-watcher squad.

Rescue squads of specialists, such as engineers, carpenters, bricklayers, welders, shorers, and electricians, should be organized, equipped, and trained to rescue people from damaged buildings. Their duties may be extended to include emergency handling of utility services. They must be able to work in silence, with hand signals. They must be trained in first aid. They must be capable of acting directly and quickly.

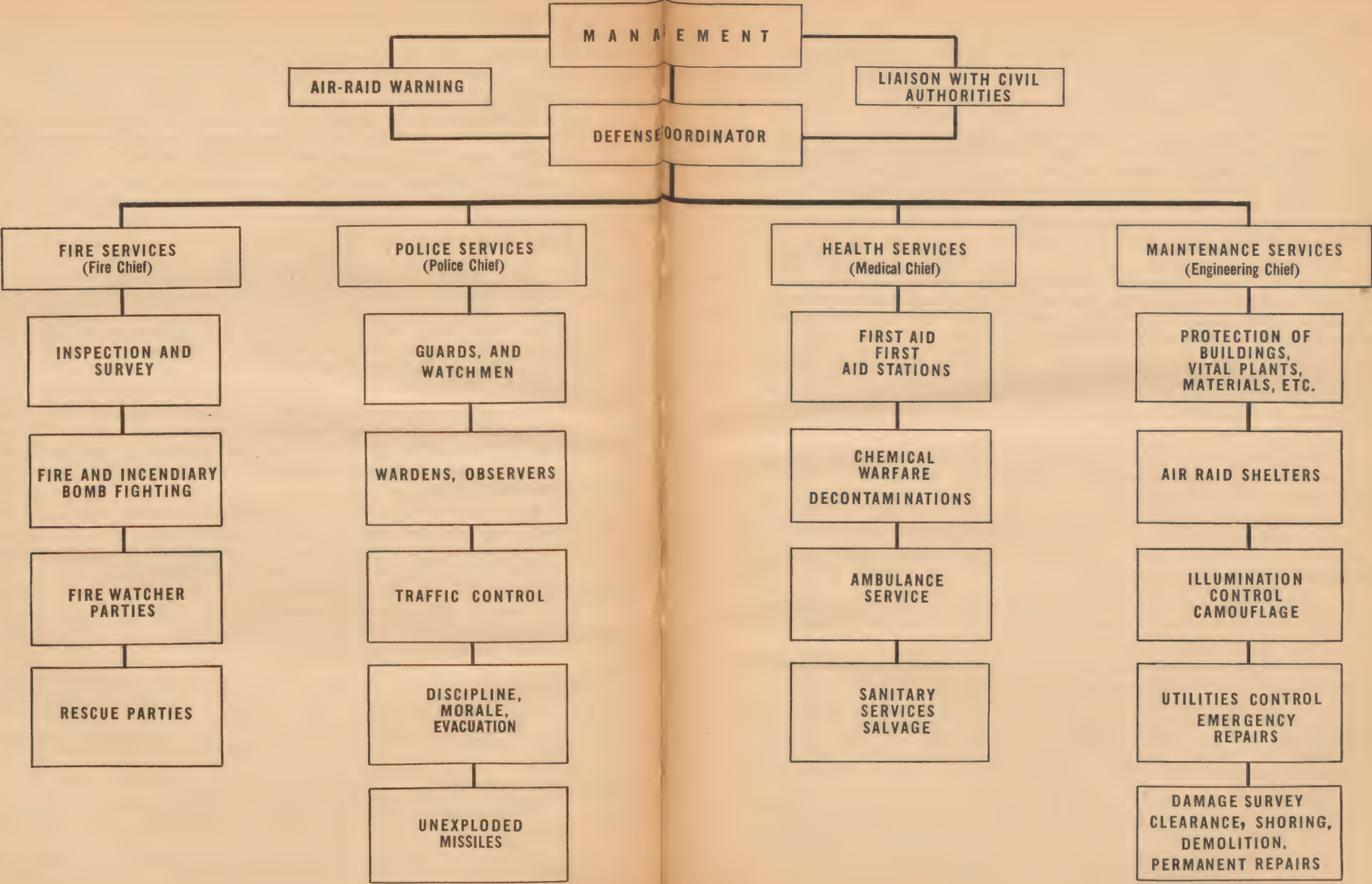
A competent fire organization consists of:

1. A main observation post, with such additional observation posts as may be necessary for observation of the entire area.
2. Protected fire-watcher posts, with necessary men, equipment, and independent water supply. These posts should occupy an elevated position to cover local buildings with high fire risks, or buildings vital to production.
3. Fire posts conveniently situated, but dispersed and decentralized, with necessary equipment.
4. Adequate main and auxiliary water supply systems.
5. Fire squads organized and ready to deal with incendiary and high explosive bombs and fires.
6. A direct communication system between fire-watcher posts, fire squads, and the headquarters of the Plant Fire Chief so that reports of fire may be made and assistance may be sent when necessary.



# INDUSTRIAL PLANT AND BUILDING PROTECTION CHART

# ORGANIZATION CHART





# PROTECTION OF INDUSTRIAL PLANTS

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## ***Police Services***

The Plant Police Chief should be in charge of the following: All police activities; the work of air raid wardens and aircraft observers; and training in gas defense and the wearing of protective devices. He should have general responsibility for maintenance of discipline and for development of morale.

The Police Chief should supervise all guards and watchmen, should be responsible for all persons entering the plant area, and should be charged with safeguarding of the plant and its material from subversive activities as well as from theft. He should control all traffic and maintain a clear route to permit the necessary automobiles, rescue trucks, etc., to reach the scene of an incident. The handling of all unexploded missiles, whether high-explosive or incendiary bombs, should be one of his responsibilities, and his men should be given special training for this work.

Under the Plant Police Chief, there should be a Senior Air Raid Warden in charge of all wardens and observers or spotters. Persons serving as wardens must be calm individuals with presence of mind who can act as advisers and guides to other employees. The wardens will be trained to work in conjunction with the local air raid warning system. They will observe where bombs fall and fires break out.

The observers should be placed on the top of a substantially constructed building in order to command as extensive a view as possible of the surrounding buildings and areas. They will report the approach of planes, bombs dropping, fires, or anything unusual of which the Senior Warden should be informed.

The wardens will be prepared to handle the evacuation of employees from the plants to air-raid shelters. Each employee should be shown how to go by the most direct route from his working station to an air-raid shelter. He should go without noise, confusion, haste, or loss of time.

The wardens will make certain that all lights are extinguished during a blackout except those permitted to remain lighted for safety or other reasons.

## ***Medical Services***

The Plant Medical Services should be under the plant physician or a practicing physician. In addition to his regular training, the Plant Medical Chief should be qualified to handle poison-gas cases.

The Medical Chief will be responsible for the organization of first-aid service and for the training of employees in such measures. So far as possible, all employees should be trained in first aid. Conveniently situated first-aid stations, in charge of trained workers, should be located throughout the plant area. These stations should be amply protected and equipped to render such treatment as is necessary until the injured person can be removed to a hospital. The ambulance service should be under the control of the Medical Chief, and only nonwalking cases should be sent to hospitals by ambulance.

The sanitary service, in all its aspects from collection of garbage to the sewage disposal system, should be watched carefully so that necessary steps can be taken to prevent disease and epidemics. The Plant Medical Chief should consult with the local health authorities regarding emergency sanitary measures for protection of water and sewage systems, especially the elimination of cross-connection between safe and unsafe water supplies and the elimination of other hazards.

# AND PUBLIC BUILDINGS

In any war or defense effort, salvage of material is necessary and important. However, salvaged materials must be treated before they can be used again. The Medical Chief should be responsible for treatment of such materials and for the organization of squads to collect and handle them.

## *Maintenance Services*

The buildings, equipment, and supplies which tend to keep the munitions of war rolling along must be protected. The maintenance services should be under the Engineering Chief, who should be a competent all-around engineer, qualified to act in a cool manner in all emergencies. He should have as his assistants the technicians who deal with plant utilities—electricity, steam, gas, water. Skilled workers, such as plumbers, pipe-fitters, machinists, welders, etc., should be detailed to key positions ready to do whatever is necessary.

The first step should be to survey the plant and make the necessary preparations for the protection of all buildings, with particular attention to the protection of all vital plants, materials, and records. If permanent improvements cannot be made, temporary devices should be improvised. Special attention should be given to the protection of plants, damage to which would seriously impede the war effort. For example, power and boiler houses and special-process plants need all the protection that can be given them. (Technical pamphlets are to be issued to give exact engineering information.)

Air-raid shelters should be prepared for protection from both gas and bombs. Consideration should be given to the safety afforded by these shelters, to entrances and exits, lighting, heating, and ventilation. Provision should be made for the serving of hot tea or coffee and light refreshments.

The control of illumination (blackout) should be studied. Means should be developed to control quickly, to any desired degree, all artificial light so that no light will be visible externally during a blackout.

Tied in with illumination control is the matter of camouflage by day. In camouflage, conspicuous objects are painted so that they will harmonize with the background and thus be concealed from view, particularly from an airplane. Any scheme of camouflage should be studied from the air by experts; otherwise, the opposite effect from that desired may be secured.

Key men should be stationed in pairs at the various utility controls, such as telephone switchboards, gas, steam, and water controls and boilers. These men must remain at their post during an air raid to be ready to handle any emergency at that post.

Because the key men must not be removed from their posts, organized repair crews must be ready to handle any emergency in a particular circuit. These emergency repair squads should be men skilled in their regular tasks who can work quickly and efficiently under adverse conditions. A list of the necessary equipment is given in the Appendix.

The latest type of high-explosive bombs has a large blast effect which causes damage to buildings within the blast area. Immediately after an air attack, a survey of the plant must be made so that any dangerous walls or foundations can be shored up or demolished, debris removed, and conditions restored to normal as rapidly as possible. Permanent repairs should be made thereafter. For immediate purposes, it is necessary that damage, shoring, and clearance squads be organized and ready to do their work.



# APPENDIX: LISTS OF EQUIPMENT

## ***FIRE WATCHER STATION (4 Men)***

- 1 pair of leather or asbestos gauntlets for each watcher.
- 1 pair of dark safety-glass goggles for each watcher.
- 1 steel helmet for each watcher.
- 1 approved type mask for each watcher, for gas or smoke.
- 4 water buckets.
- 1 pump tank extinguisher.
- 1 fire axe.
- 2 bags, each filled with about 10 pounds of sand.
- 2 electric lanterns.
- 2 one-pound sealed packages of copper sulphate to be dissolved in water (1 pound of copper sulphate per bucket) for use on phosphorous.
- 3 blankets and large safety pins.
- 1 crowbar.
- 100 feet of 1/2-inch line.
- 3 corrugated iron sheets.

## ***DUTIES OF SQUAD***

- Member No. 1: Direct and handle nozzle.
- Member No. 2: Operate portable pump.
- Member No. 3: Refill pump tank extinguisher.
- Member No. 4: Assist and act as runner.

## ***UTILITY CONTROL SQUAD (4 or 5 Men)***

- 1 helmet each.
- 1 approved type gas mask for each man, for gas or smoke.
- 3 or 4 electric lanterns with spare bulb and battery for each.
- 1 truck with driver.
- 1 bound map of utility service showing layout of distribution systems, location of valves, switches, etc.
- Proper tools, supplies, and other equipment for efficient execution of assigned duties.
- NOTE.—All of the above should be kept available on the truck.







***Medical Division  
Bulletin No. 1***

**EMERGENCY  
MEDICAL  
SERVICES  
FOR  
CIVILIAN DEFENSE**



***United States Office of Civilian Defense  
Washington, D. C.***





# OFFICE OF CIVILIAN DEFENSE

WASHINGTON, D. C.

## Medical Provisions for Civilian Defense

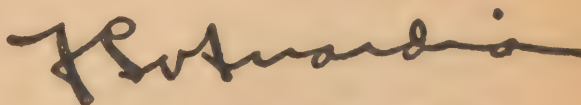
The activities of the U. S. Office of Civilian Defense are concerned primarily with the protection of lives and property in the event of enemy action. To its Medical Division is entrusted the responsibility for the preparation of plans for Civilian Defense designed to prevent or alleviate the medical and public health hazards to which the civilian population may be exposed.

This bulletin is the first of a series of recommendations to State and Local Directors of Civilian Defense concerning the augmentation of medical facilities in their area. It presents a simple basic plan for the organization of Emergency Medical Field Units related to hospitals, which can be adapted to the needs of any community. It directs attention to the possible future requirements for expansion of hospital facilities both within a community and outside its boundaries. To this end, it recommends the immediate preparation of a local inventory, a report of which should be filed in duplicate with the Regional Office of Civilian Defense. It also recommends that steps be initiated in each local area for the rapid expansion of nursing facilities through intensive training of adequate numbers of nursing auxiliaries.

To those who do not as yet appreciate the need for action, I should like to quote from a similar official bulletin issued in England in 1938 just prior to the beginning of hostilities, which describes measures for safeguarding the civilian population:

"The need for [these measures] is not related to any belief that war is imminent. It arises from the fact that the risk of attack from the air, however remote it may be, is a risk that cannot be ignored, and because preparations to minimize the consequences of attack from the air cannot be improvised on the spur of the moment but must be made, if they are to be effective, in time of peace."

Whether or not we regard danger to the lives and the property of our people as imminent, I would urge that immediate steps be taken to carry out these recommendations of the Office of Civilian Defense in every State along our seaboards and in industrial areas in the interior.



F. H. LaGUARDIA,  
U. S. Director Civilian Defense.

WASHINGTON, D. C.  
July 30, 1941

# EMERGENCY MEDICAL SERVICES



## UNITED STATES OFFICE OF CIVILIAN DEFENSE

Dupont Circle Building - - Washington, D. C.

### REGIONAL OFFICES

#### FIRST CIVILIAN DEFENSE REGION

101 Milk Street, Boston, Massachusetts

#### SECOND CIVILIAN DEFENSE REGION

111 Eighth Avenue, New York City

#### THIRD CIVILIAN DEFENSE REGION

1554 Baltimore Trust Building, Baltimore, Maryland

#### FOURTH CIVILIAN DEFENSE REGION

First Floor Hurt Building, Atlanta, Georgia

#### FIFTH CIVILIAN DEFENSE REGION

427 Cleveland Avenue, Columbus, Ohio

#### SIXTH CIVILIAN DEFENSE REGION

20 N. Wacker Drive, Chicago, Illinois

#### SEVENTH CIVILIAN DEFENSE REGION

620 World Herald Building, Omaha, Nebraska

#### EIGHTH CIVILIAN DEFENSE REGION

Room 1014 Majestic Building, San Antonio, Texas

#### NINTH CIVILIAN DEFENSE REGION

233 Sansome Street, San Francisco, California



# Emergency Medical Services for CIVILIAN DEFENSE

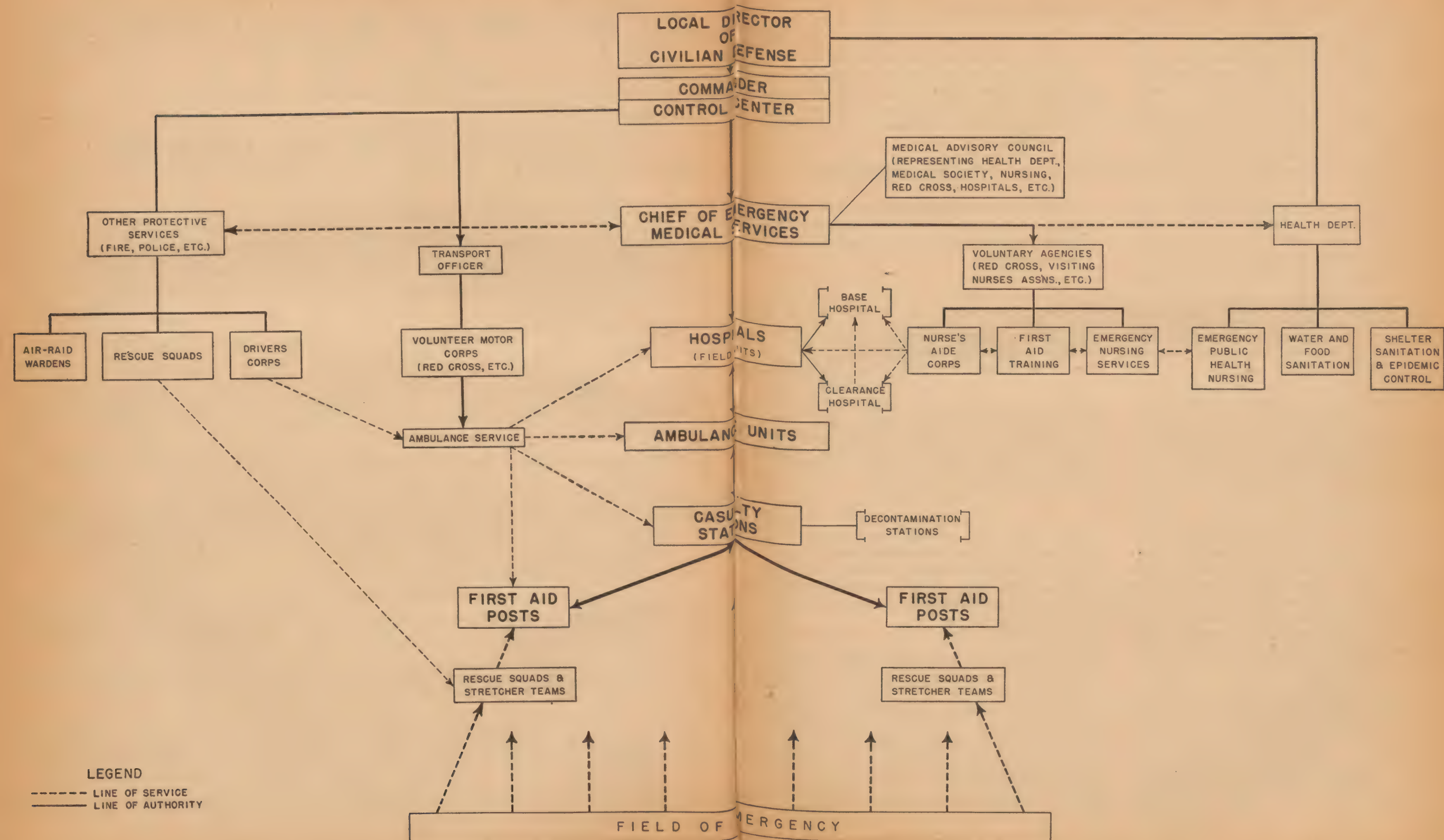
**C**URRENT developments in techniques of warfare leading to unheralded bombing of civilian populations as well as potential hazards from sabotage, make imperative the preparation of facilities for providing medical service to casualties that may result from such incidents. The organization of these emergency facilities must be a fundamental part of our Civilian Defense program. It is the purpose of this bulletin to outline the essentials of an Emergency Medical Service and to describe a type of organization by which these essentials may be achieved.

The Medical Division of the Office of Civilian Defense is charged with the preparation of plans for emergency medical service. It maintains liaison with other Federal agencies concerned with public health and medical care. An officer of the United States Public Health Service has been assigned to each Regional Office of Civilian Defense to assist State and local defense councils in the organization of Emergency Medical Services. In addition, the United States Public Health Service liaison officer attached to the Army Corps Area Headquarters has been designated to serve as medical consultant to the Civilian Defense Regional Office (see map).

Because of geographical and administrative diversity in various parts of the country, general plans are presented as recommendations to State and local defense councils for adaptation to meet the needs of the different regions. The general adoption of a common pattern in organization and equipment for civilian defense is highly desirable so that adjacent communities may pool or exchange emergency resources in time of need.

Local administrative areas for civilian defense will frequently extend beyond municipal or other political boundaries. Such administrative civilian defense areas may be defined by State Defense Councils. It is important that the Emergency Medical Services be integrated at all administrative levels with welfare, police, and other emergency services and with the Red Cross.

# ORGANIZATION OF LOCAL EMERGENCY MEDICAL SERVICES





## I. LOCAL CHIEF OF EMERGENCY MEDICAL SERVICE.

An Emergency Medical Service should be organized as a section of the local defense organization in each area under a director responsible to the local Director of Civilian Defense. It is recommended that the local Chief of Emergency Medical Service be a physician of broad experience and administrative capacity, such as a health officer or

an experienced hospital administrator. It should be his first duty to make an inventory of the community's medical resources and facilities, and to prepare local plans, develop an organization, and provide for the training of personnel to carry out the functions of the Emergency Medical Service outlined below.

## II. LOCAL MEDICAL ADVISORY COUNCIL ON CIVILIAN DEFENSE.

The local Chief of Emergency Medical Service should be Chairman of a Medical Advisory Council. This Council might well include the local health officer, an experienced hospital administrator, a physician recommended by the local medical soci-

ety because of his technical experience and executive ability, a registered nurse, and a representative of the American National Red Cross and other voluntary agencies.

## III. EMERGENCY MEDICAL FIELD UNITS.

In States on both seaboards and in vulnerable industrial areas in the interior, general hospitals, both voluntary and governmental, including Veterans' Administration Facilities and the Marine Hospitals of the United States Public Health Service, should organize Emergency Medical Field Units and assemble basic equipment. An Emergency Medical Field Unit should consist of two or more squads, and a physician should be appointed to

command the entire unit. Squad leaders, in turn, should be designated. The size of the Emergency Field Unit should be in proportion to the bed capacity of the parent hospital. All members of Field Units should be instructed in first aid,\* including care of burns, prevention of shock, control of hemorrhage, emergency treatment of fractures and wounds, and in transportation of the injured.

### A. Personnel.

**1. SMALL SQUADS:** In hospitals of less than 200 beds, it is recommended that the Emergency Field Unit consist of two squads, one for each 12-hour shift of the day. Each squad should be composed of two physicians, two or more nurses, and two or more orderlies or nurses' aides, and be capable of functioning, if necessary, as two separate teams. At least one Unit of this size is advisable for a population up to 25,000.

**2. LARGE SQUADS:** In hospitals of more than 200 beds the Emergency Field Unit should consist of two squads of four doctors, four or more nurses, and four or more orderlies or nurses' aides, one of the physicians in each squad to act as squad leader. Each of the squads should be on first call during a

12-hour period of the day. The personnel and equipment of a squad should be divisible into four teams, capable of functioning if necessary at separate sites of disaster. At least one Unit of this size or two Units with small squads are advisable for populations up to 50,000.

**3.** In hospitals of more than 350 beds the Emergency Field Unit should consist of four or more large squads, each headed by a squad leader and capable of functioning, if necessary, as multiple teams. In these large hospitals at least two squads should be on call during each 12-hour period of the day, alternating on first call on alternate days. An Emergency Field Unit of four large squads or two

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\*Advanced First Aid course prepared by the Office of Civilian Defense in collaboration with the American National Red Cross.



Units of two large squads each are advisable for a population of 100,000.

**4.** It will be advisable to organize physicians and nurses engaged in private practice in the area into reserve Emergency Field Units related to hospitals. In areas with no hospitals and in hospitals whose resident staffs cannot be depleted, the primary Emergency Unit of a hospital may be made up in whole or in part of practitioners from the community.

### **B. Transportation.**

A hospital ambulance, station wagon, small truck, or passenger vehicle will be adequate to transport the personnel of a squad and their equipment when dispatched by the Control Center to a site previously designated for the establishment of a Casualty Station. After return trips to the hospital with casualties such vehicle will be available for transportation of additional squads and equipment if required. Hospitals which do not maintain an ambulance service will find it necessary to provide for transportation, utilizing private or municipal ambulance services, small vehicles of the police, fire, or other municipal departments, station wagons, or passenger cars. Special racks can be installed in private ambulances and in station wagons and small trucks so that they may be utilized in an emergency for the transportation of four or more stretcher patients at a time.

Private vehicles recruited for ambulance purposes by the American National Red Cross or other agency should be assigned to a hospital or to a designated parking center under the control of a transport officer in the Control Center.

### **C. Medical and Surgical Equipment.**

The medical and surgical equipment for a squad should consist of a working supply for each physician's team and a reserve supply of sterile dressings and equipment in drums or packs from which the working supplies of the teams may be replenished. The working supply of each team is best carried in a portable bag, box, or haversack. A list indicating minimum equipment is available in Bulletin No. 2, "Equipment and Operation of Emergency Medical Field Units."

The provision of working supplies for each physician in a separate container will permit the squad of a Casualty Station to split off teams of one physician and assistants who can be dispatched to set up subsidiary First Aid Posts close to the site of disaster.

### **D. Casualty Stations and First Aid Posts.**

Upon arrival at the site of a disaster, the squads of the Emergency Medical Units which have responded to the call of the Control Center will set up Casualty Stations at the sites designated by the local Director of Civilian Defense. The location of a Casualty Station should provide safety, shelter, and accessibility. Stretchers, cots, and blankets will be transported to the Casualty Station from the Medical Depot. Until relieved by the Control Center, the physicians and nurses of the Emergency Medical Unit should remain at their station, to which the injured will be directed or transported on stretchers by Stretcher Teams enlisted for this purpose. The work of the Casualty Station is to be limited to emergency first aid procedures—the relief of pain, prevention of shock, control of hemorrhage, care of burns, application of simple splints and of surgical dressings and, not least, the preservation of morale by the establishment of confidence. The seriously injured will be evacuated as rapidly as possible by ambulance or other vehicle to a hospital. Those with minor injuries will go to their homes or to temporary shelters.

If necessary, the squad leader in charge of a Casualty Station may split off one or more teams of one physician and assistants, dispatching them to set up subsidiary First Aid Posts at other sites.

It will be advisable for the local Chief of Emergency Medical Service to prepare a spot map of the area to indicate all out-patient clinics, health centers and their substations, and all police and fire stations or other sites which could serve in an emergency as Casualty Stations. He should also maintain an inventory of available transportation.

### **E. Decontamination Stations and Gas Defense.**

These subjects are discussed in separate publications of the Office of Civilian Defense—"First Aid in the Prevention and Treatment of Chemical Casualties" and "Protection Against Gas."

## F. Rescue Squads and Stretcher Teams.

Rescue Squads are groups of men organized under the Fire Services who are responsible for the extrication of persons trapped in collapsed or demolished buildings. Members are trained in first aid and are able and equipped to render minimal care for casualties pending the arrival of the First Aid Team.

After their removal from points of special danger by the Rescue Squads, casualties should be turned over to Stretcher Teams of Medical Auxiliaries, which will transport them to First Aid Posts or Casualty Stations. Casualties not requiring stretcher transport should be directed to a Casualty Station.

## G. Medical Depots.

Medical Depots for the storage of collapsible cots, blankets, and stretchers should be established and the sites indicated on the spot map of the community. Unless these items are located at a Casualty Station they should be dispatched to the site by the transport officer in the Control Center.

Eight stretchers, 24 cots, and 64 blankets should be available per 10,000 population. Two pairs of saw horses, each 36 inches high, should be available for each Casualty Station. Stretchers placed on the horses may be used as dressing tables.

## H. Records.

Identification tags should be affixed to the injured by the Rescue Squad or else immediately upon arrival at the Casualty Station or First Aid Post. A record should be kept in the Casualty Record Book,

which should be standard equipment for each medical team. The record should include the name, address, person to be notified, diagnosis, first aid administered, morphine, if given, and disposition. A form approved by the Medical Division of the Office of Civilian Defense will be found in Bulletin No. 2, "Equipment and Operation of Emergency Medical Field Units." A nurse or nurse's aide should be assigned the responsibility for these records. Using a red skin pencil, the letters *TK* or *U* should be drawn on the forehead of the casualty indicating the presence of a tourniquet or the necessity for priority attention.

## I. Drills.

It is recommended that drills be called at each hospital every week by the unit leader. A record of each drill should be kept by him, which will show the time required for complete mobilization of a squad at the designated point of departure and the condition of equipment.

It is also recommended that field drills for each unit be called unexpectedly by the local Director of Civilian Defense. Each field drill might appropriately include other units of the Citizens' Defense Corps. The official in command at the drills should inspect the clothing, equipment, and transportation of all participating units and render a report to the Chief of Emergency Medical Service and to the local Director of Civilian Defense upon the promptness and efficiency of each unit. The larger field drills might include the Canteen and other Emergency Relief Services of the Welfare Department or of the local chapter of the American Red Cross or other local agency.

## IV. BASE AND EVACUATION OR CLEARANCE HOSPITALS.

In order to prepare for the release of hospital beds within the area for large numbers of casualties, the Chief of Emergency Medical Service should make an inventory of hospitals, convalescent homes, and other institutions within a radius of 50 or more miles, to which maternity services, children's wards, certain categories of the hospitalized sick, and convalescents could be transported. Provision should also be made for the assembly and storage of an adequate supply of hospital cots, mattresses, blankets, and other equipment which may be required to provide for emergency increase in

bed capacity of voluntary and governmental hospitals. In the event of actual destruction of hospitals, it may become necessary to consider evacuating casualties to Base Hospitals and transforming hospitals near the scene into Evacuation or Casualty Clearance Hospitals.

Upon receiving the first emergency call, the hospital should order all members of its visiting staff by telephone or police radio call to report to the hospital and stand by for the care of the injured received from the Casualty Stations and First Aid Posts.



## V. AUGMENTATION OF NURSING SERVICES.

In the face of the need for rapid expansion of nursing services for civilian defense, the number of available nurses is being depleted because of the requirements of the military forces and the public health and industrial hygiene services. An attempt is being made to compensate for this deficiency by the training of subsidiary hospital workers through the NYA, WPA, and other programs. The Office of Civilian Defense in collaboration with the American National Red Cross has revised the instruction curriculum for Volunteer Nurses' Aides, so as to provide for a period of intensive practical instruction in hospitals under the direction of a special instructor in charge of the training and use of Volunteer Nurses' Aides. Upon

completion of this practical training, Volunteer Nurses' Aides will become eligible to assist nurses in wards and out-patient clinics of hospitals, or in visiting nurse, public health, industrial hygiene, and school health services. Volunteer Nurses' Aides are intended to supplement the work of the nurse, so that she may be able to serve a greater number of patients. It is recommended that the local Chief of Emergency Medical Service in collaboration with hospital executives and directors of schools of nursing reorganize and intensify the training and the use of Volunteer Nurses' Aides in appropriate hospitals in accordance with the new schedule of the Office of Civilian Defense and the American National Red Cross.

## VI. FIRST AID.

First aid instruction should be provided for as large a part of the general population as possible. The local Chief of Emergency Medical Service should, in collaboration with the local chapter of the American National Red Cross, provide training in first aid for at least 5 percent of the personnel of all municipal departments and large business and industrial establishments. Upon completion of training, this 5 percent should constitute the first aid corps of their municipal department, business, or factory group. The leaders of these corps should be encouraged to take the Instructor's Course of the American National Red Cross so that, when qualified, their services might be utilized for the extension of first aid instruction to all employees and to the general population of the community.

The First Aid Course for Civilian Defense prepared by the American National Red Cross in col-

laboration with the Office of Civilian Defense is recommended for first aid training. Instructors qualified by the Red Cross may give the training under the direction of the local chapter of the American Red Cross, the local health department, or any other voluntary or governmental agency.

An intensive course of practical training (five 2-hour lessons) has been prepared by the Medical Division of the Office of Civilian Defense and the American National Red Cross as supplementary instruction for members of Emergency Medical Field Units and for nursing auxiliaries and members of other Civilian Defense Units (police officers, firemen, and volunteer auxiliaries) who have had previous instruction in first aid. It is designed as a refresher course for the purpose of reviewing and practicing those first aid procedures which are most important in Civilian Defense.





**Emergency Medical Services for Civilian Defense**  
*United States Office of Civilian Defense*  
*Washington, D. C.*

***Medical Division***  
***Bulletin No. 2***

# **EQUIPMENT & OPERATION OF EMERGENCY MEDICAL FIELD UNITS**



***United States Office of Civilian Defense***  
***Washington, D. C.***



## UNITED STATES OFFICE OF CIVILIAN DEFENSE

Washington, D. C.

***Regional Medical Officers assigned to the Regional Offices will assist State and local Defense Councils in their respective regions with the organization of an Emergency Medical Service and other objectives of the Civilian Defense program.***

### REGIONAL OFFICES :

**FIRST CIVILIAN DEFENSE REGION**  
101 Milk Street, Boston, Mass.

**SECOND CIVILIAN DEFENSE REGION**  
111 Eighth Avenue, New York City

**THIRD CIVILIAN DEFENSE REGION**  
400 Cathedral Street, Baltimore, Md.

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Hurt Building, Atlanta, Ga.

**FIFTH CIVILIAN DEFENSE REGION**  
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**SEVENTH CIVILIAN DEFENSE REGION**  
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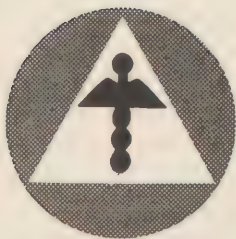
**EIGHTH CIVILIAN DEFENSE REGION**  
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## **THIS BULLETIN**

supplements Medical Division Bulletin No. 1, which deals with the organization of Emergency Medical Service for Civilian Defense. The Office of Civilian Defense recommends that State and local Defense Councils adopt the plans set forth in these Bulletins so as to secure the advantages of uniformity in organization, equipment, and operation of Emergency Medical Field Units. In the event of a civilian disaster, adjacent communities which have adopted this common pattern can pool or exchange their resources. The adoption of uniform equipment standards during the National Emergency is desirable also because of priorities in materials and manufacture. The recommended equipment conforms as far as possible, therefore, with that of the Medical Department of the United States Army.



## **I. THE FIELD CASUALTY SERVICE**

As recommended in Bulletin No. 1 of the Medical Division, Emergency Medical Field Units should be established in all approved general hospitals, both voluntary and governmental, located in coastal States and in industrial centers of the interior. The plan of organization and size of the Emergency Field Units for hospitals of various sizes and the total number of Field Units recommended on a population basis are outlined in Bulletin No. 1.

The Emergency Medical Field Units of a hospital are composed of two or more squads, so that at least one squad is on first call during each 12-hour period of the day. In larger hospitals reserve squads should be available at the call of the Control Center in the event that multiple sites of disaster should require the manning of additional Casualty Stations and First-Aid Posts. All members of Emergency Medical Field Units should be systematically drilled in first-aid procedures.

To be prepared to respond promptly and effectively, Emergency Medical Units should also participate in field drills. These drills should be called by the local defense authority and should include police and fire auxiliaries, rescue squads, stretcher teams, transport and canteen services so that the local protection services may be integrated.

During the present period of preparation, Medical Field Units should be related to hospitals. Prompt availability in the event of sudden and unexpected disaster can be expected only of Units organized largely from the

## ***Equipment and Operation of Emergency Medical Field Units***

interne and resident staffs. It is advisable to designate an assistant surgical resident or surgical interne as Squad Leader. In order not to deplete the surgical staff of the hospital, other members of Emergency Squads may be derived from the medical, pediatric, and other nonsurgical divisions of the hospital.

1. **RESERVE SQUADS.**—In the event of the more remote possibility of prolonged and continuous need for service in Casualty Stations and First-Aid Posts, it would become necessary to replace most of the hospital personnel assigned to the Field Casualty Service. Reserve squads made up of medical, nursing, and trained volunteer personnel from the community would carry the major responsibilities for the field service. Until the need is demonstrated, it will be simpler and more efficient to concentrate the primary organization of Emergency Medical Field Units for the most part within approved hospitals.

In hospitals whose resident staff should not be depleted even for a temporary emergency, the primary Medical Field Unit may be organized in part or even wholly from physicians and nurses engaged in private practice in the community.

2. **OPERATION OF FIELD CASUALTY SERVICE.**—The operation of the Field Casualty Service may be sketched as follows: Air raid warnings will come to the local Control Center from the military establishments in the area and will be relayed to the proper Civilian Defense Officers. Information concerning the location and extent of local damage will be transmitted promptly to the Control Center by Air Raid Wardens and other observers. Using a spot map showing the location of hospitals and sites for Casualty Stations, the Control Center or its substation will call out an appropriate number of Emergency Medical Field Units.

The squads of the Emergency Medical Units which have responded will proceed to the sites to which they have been directed by the Control Center or its substation and set up Casualty Stations. When indicated, the squad leader in charge of a Casualty Station may dispatch one or more teams of physicians, nurses, and nursing auxiliaries to establish First-Aid Posts at sites closer to the disaster. The establishment of fixed First-Aid Posts and Casualty Stations is not at present contemplated.

### ***a. Casualty Stations***

The *Casualty Station* will occupy a predetermined site such as the clinic of a hospital, health department or voluntary agency, a health center or substation, a school basement or other suitable place which provides shelter, protection, and accessibility. It should be located if possible on a side street so that ambulances will not block main thoroughfares. The sites selected for Casualty Stations should be numbered and indicated on a spot map of the community. The Casualty Station will:

1. Serve as a center from which medical teams may be sent closer to the disaster if required.

2. Care for persons with minor injuries and for those suffering from nervous shock and hysteria until they may be permitted to return to their homes or to temporary shelters. This will protect hospitals from the burden



## ***Equipment and Operation of Emergency Medical Field Units***

of minor casualties which would interfere with the work of caring for the seriously injured.

3. Keep a record of all persons treated at the Station and see that all casualties transferred to a hospital are tagged.

The Casualty Station is to be supplied with stretchers, collapsible cots, and blankets from medical depots located at sites from which the transportation of Emergency Medical Service is derived. Eight stretchers, 24 cots, and 64 blankets should be available per 10,000 population for issue to Casualty Stations as the need arises. Where kitchen tables are not available at the location of a Casualty Station, two pairs of saw horses, each 36 inches high, may be required, upon which stretchers may be placed to serve as dressing tables. Stretcher teams and rescue squads will obtain their stretchers at Casualty Stations.

### ***b. First-Aid Posts***

The First-Aid Post will occupy a temporary location usually close to the scene of disaster and will:

1. Care for the more severely injured, preparatory to their transfer to a hospital. No surgery other than emergency first aid is contemplated.

2. Classify the casualties so as to expedite the transfer of the seriously injured to a hospital a most important responsibility which requires surgical judgment.

3. Direct the stream of ambulatory and of slightly injured stretcher patients and those suffering from nervous shock or hysteria to a Casualty Station.

4. Tag all casualties immediately. Maintain entries in Casualty Record Book of all persons receiving first aid. (A nurse or nurse's aide should be responsible for these records.)

## **II. EQUIPMENT FOR EMERGENCY MEDICAL FIELD UNITS**

The following lists include only the minimum medical and surgical equipment required for emergency treatment at the site of a disaster. Provision for other than essential minor surgery has purposely been omitted.

The equipment for each physician and his team is to be carried in two portable boxes provided with handles. These two boxes should be of the same size (15 by 20 by 8 inches), and they may be packed conveniently in the ambulance or other vehicle transporting the Emergency Squad to the site of the Casualty Station. The provision in separate containers of working supplies for each physician will permit the squad of a Casualty Station to split off one or more teams of physician and assistants who can be dispatched with their equipment to set up advanced First-Aid Posts.



## Equipment and Operation of Emergency Medical Field Units

### a. List No. 1.—Equipment for a First-Aid Post

(Working supply for one physician's team)

List No. 1 indicates the medical and surgical equipment for each physician of an Emergency Medical Field Unit and his team of nurse and orderly or nurses' aide. One or more such teams man a First-Aid Post. First-Aid Posts are subsidiary to a Casualty Station which will furnish replacements of drugs and surgical supplies.

Cases, carrying, waterproof..... 2

#### INSTRUMENTS

Scissors, surgical, Mayo 5½" curved..... 1

Scissors, surgical, Mayo 5½" straight..... 1

Scissors, bandage, angular, 7½"..... 2

Forceps, hemostatic, Rochester, curved, 6¼"..... 6

Forceps, hemostatic, Rochester, straight, 5½"..... 6

Forceps, tissue, spring, 5½"..... 1

Forceps, tissue, spring, mouse-tooth, 5½"..... 1

Forceps, tongue holding, 7"..... 1

Tube, breathing (airway) hard rubber or metal (adult)..... 1

Tube, breathing (airway) hard rubber or metal (child)..... 1

Retractor, tissue, double end nested 9" and 10" Army type, pair..... 1

Syringe, hypodermic, Luer, 2 cc..... 2

Needles, hypodermic, 25 gage, ½"..... 12

Needles, hypodermic, 19 gage, 1½"..... 6

Tubes, constriction (length 3") for needles..... 12

Stoppers, tube, constriction for needles..... 12

Handles, Bard Parker, No. 3..... 2

Blades, Bard Parker, No. 10, package of 6..... 1

#### SUTURE MATERIAL

Catgut, plain No. 1, tubes, boilable..... 6

Silk, dermal, medium, 40" strand, package of..... 6

Needles, suture, catgut, size 1, half-circle, trochar point, Mayo..... 6

Needles, cutting edge, straight..... 6

#### DRUGS

Morphine sulfate syrettes, 0.015 gm..... 20

Morphine sulfate syrettes, 0.030 gm..... 10

Sulfathiazole, powder, vials, 5 gm..... 12

Ointment, ophthalmic, boric acid, 5%, tube, 4 gm..... 1

Jelly, tannic acid, tube, 45 gm..... 2

Alcohol, denatured, ethyl, bottle, 500 cc..... 1

Ammonia, aromatic spirit, bottle, 60 cc..... 1

Sodium bicarbonate..... ½ lb.

Phenobarbital tablets, 0.03 gm..... 100

Caffeine sodium benzoate, ampules, 0.5 gm..... 12

Epinephrin hydrochloride, 1:1000..... 20 cc.

#### DRESSINGS AND BANDAGES

Compress, gauze, 4" x 4"..... 100

Compress, gauze, 2" x 2"..... 200

Pad, surgical, 8" x 10" (Dakin)..... 25

Bandage, gauze, 2"..... 24

## **Equipment and Operation of Emergency Medical Field Units**

### **DRESSINGS AND BANDAGES (Continued)**

Bandage, muslin, 4".....	24
Bandage, triangular, muslin, 50" x 36" x 36".....	24
Cotton, absorbent, roll, sterile.....	2 oz.
Cotton batting, roll.....	1 lb.
Plaster, adhesive, 2" x 10 yards, roll.....	2

### **MISCELLANEOUS SUPPLIES**

Pins, safety, large.....	48
Splints, basswood.....	12
Depressors, tongue, wood.....	24
Applicators, wood.....	25
Sheeting, rubber (45" x 72").....	1
Basins, white enamel, 9" x 6" x 1 7/8" (one with cover).....	2
Stove, gasoline (Coleman).....	1
Pencil, indelible.....	1
Pencil, dermatographic (red).....	1
Pads, heating, chemical.....	4
Pads, heating, refills, chemical.....	4
Gloves, surgeon's, rubber, size No. 8 (latex), pair.....	2
Flashlight (two-cell).....	1
Battery, dry cell, for flashlight, No. 950.....	4
Lantern, electric, dry-cell type.....	1
Battery, dry cell, for lantern, No. 6.....	4
Cups, paper.....	25
Brush, nail.....	1
Soap, hand, bar.....	2
Towels, hand.....	12
Matches, safety, box.....	3
Tourniquet, field, web.....	3
Bag, laundry, small.....	1
Tags, identification, book of 20.....	6
Casualty record book.....	1

### **b. List No. 2.—Equipment for a Casualty Station**

*(Supplementary supplies for an emergency squad of two or four physicians, nurses, and nursing auxiliaries.)*

List No. 2 indicates the medical and surgical equipment for a Casualty Station. It contains bulky articles such as traction splints which could not be included in the equipment of the First-Aid Post without impairing its mobility. These articles will be issued from the Casualty Station to the First-Aid Posts as the need arises. Casualty Stations are also stocked with dressings, bandages, and drugs from which the supplies of the First-Aid Posts may be replenished. Blood, plasma, and other biological products such as tetanus antitoxin or toxoid may be obtained by Casualty Stations from the parent hospital as needed. They are, therefore, omitted from this list.

Trunk, Army type.....	1
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### **TRACTION SPLINTS**

Splint, arm, hinge, Thomas.....	4
---------------------------------	---

## **Equipment and Operation of Emergency Medical Field Units**

### **TRACTION SPLINTS (Continued)**

Splint, leg, half-ring, Army type.....	4
Splint, Thomas, leg, child.....	2
Splint, arm, Murray Jones, child.....	2

### **SUTURE MATERIAL**

Catgut, plain No. 1, tubes, boilable.....	12
Silk, dermal, medium 40" strand, package of 12.....	1
Needles, suture, size No. 1 half-circle, trochar point, Mayo.....	12
Needles, cutting edge, straight.....	12

### **DRUGS**

Morphine sulphate syrettes, 0.015 gm.....	40
Morphine sulphate syrettes, 0.030 gm.....	20
Sulfathiazole, powder, vials, 5 gm.....	24
Ointment, boric acid, ophthalmic, 5%, tube, 4 gm.....	2
Jelly, tannic acid, tube, 45 gm.....	4
Alcohol, denatured, ethyl, 70%.....	1 qt.
Ammonia aromatic spirit, bottle 60 cc.....	1
Sodium bicarbonate.....	1 lb.
Phenobarbital tablets, 0.03 gm.....	200
Caffeine sodium benzoate ampoules, 0.5 gm.....	24
Procaine hydrochloride tablets, 0.18 gm.....	100
Sodium chloride compressed tablets, 1 gm.....	100

### **DRESSINGS AND BANDAGES**

Compress, gauze, 4" x 4".....	200
Compress, gauze, 2" x 2".....	400
Pad, surgical, 8" x 10" (Dakin).....	50
Bandage, gauze, 2".....	48
Bandage, muslin, 4".....	48
Bandage, triangular, muslin (50" x 36" x 36").....	48
Cotton, absorbent, roll.....	1 lb.
Cotton batting, roll.....	2 lb.
Plaster, adhesive, 2" x 10 yards.....	4

### **MISCELLANEOUS SUPPLIES**

Pins, safety, large.....	100
Splints, basswood.....	30
Depressors, tongue, wood.....	100
Applicators, wood.....	50
Sheeting, rubber (45" x 72").....	2
Basins, white enamel, 9" x 6" x 1 7/8" (2 with cover).....	4
Stove, gasoline (Coleman).....	2
Catheter, urethral, rubber, F14.....	4
Pencil, indelible.....	4
Pencil, dermatographic (red).....	4
Pads, heating, chemical.....	8
Refills, pads, heating, chemical.....	8
Gloves, surgeon's, rubber, size 8 (latex), pair.....	4
Lantern, electric, dry cell.....	2
Batteries, dry cell, lantern, No. 6.....	12
Cups, paper.....	50
Brush, nail.....	2
Soap, hand, bar.....	4



**MISCELLANEOUS SUPPLIES (Continued)**

Towels, hand.....	24
Matches, safety, package of 12 boxes.....	1
Tourniquet, field web.....	6
Bag, laundry, small.....	2
Tags, identification book (books of 20).....	6
Razor, safety.....	1
Blades, safety razor.....	12

### **III. IDENTIFICATION TAGS**

The identification tag (Figure 1) is to be filled out by the first member of a Rescue Squad, Stretcher Team, or First-Aid Post to reach the casualty. This must be done immediately because the injured may lose consciousness. All the required information should be recorded. Information concerning the name and address of the injured and of the "person to be notified" are important to those anxious to locate the injured person. The place where an unconscious patient was found should be noted as this may be the only clue to his identity.

It is important to record administration of narcotics or application of a tourniquet. Further treatment given at the First-Aid Post or Casualty Station should be indicated on the back of the identification tag. Warnings concerning possible internal injury, hemorrhage, skull fracture, etc. should also be noted on the back of the tag to facilitate sorting of patients on arrival at the hospital.

The tag should be affixed securely to the patient and not to clothing which might later be removed.

A set of symbols to indicate necessity for priority treatment has been devised to facilitate sorting of patients at the hospital. These symbols should be drawn prominently on the forehead of the patient at the First-Aid Post or Casualty Station with a red skin pencil.

U=Urgent—requiring priority attention.

TK=Tourniquet.

T=Indicating tetanus antitoxin has been given.

H=Internal hemorrhage.

M $\frac{1}{4}$ =Indicating morphine gr.  $\frac{1}{4}$  or

M $\frac{1}{2}$ =gr.  $\frac{1}{2}$  given.

In addition to the identification tag, a Casualty Record Book will also be part of the equipment of each physician's team (Figure 2). A nurse or nurses' aide should be assigned the responsibility for entering a record of every patient seen. This record should include the diagnosis, treatment, and disposition.

## **IV. ORGANIZATION CHARTS FOR EMERGENCY MEDICAL FIELD UNITS**

FIGURES 3, 4, and 5

The charts shown in figures 3, 4, and 5 have been designed to enable hospitals to record the personnel of their Emergency Medical Field Unit. Three sample charts are appended for units of various sizes. It may be preferable to designate members of the unit by title rather than by name, in order to avoid confusion each time internes or residents rotate to other services in the hospital. Charts are available on application to the local Chief of Emergency Medical Services or to the medical division of the State Defense Council.

Each hospital should send a copy of the organization chart of its Emergency Medical Field Unit to the local Chief of Emergency Medical Services and should keep him informed of changes in personnel.

## **V. EMERGENCY MEDICAL SERVICES**

It is important that each local Defense Council in the States along both seaboards and in industrial centers in the interior appoint without delay a Chief of Emergency Medical Service who will be responsible to the local Director of Civilian Defense for the organization of the Emergency Medical Service described in Medical Division Bulletin No. 1. He should be an outstanding medical leader, and it is advisable that he be selected in consultation with the State Defense Council, the local medical society, and the local health officer. To facilitate the integration of all local medical resources into a comprehensive program for civilian protection, it is recommended that the local Chief of Emergency Medical Service be assisted by a Medical Advisory Council, consisting of the local health officer, an experienced hospital executive, and representatives of the local medical society, the nursing profession, the American Red Cross, and participating voluntary agencies.

### **a. Duties of the Local Chief of Emergency Medical Service**

Under the administrative authority of the local Director of Civilian Defense, the duties of the local Chief of Emergency Medical Services (EMS) are:

1. To determine the scope of the activities of all official and voluntary organizations which are to participate in the emergency medical program of civilian defense, to integrate these organizations into the comprehensive local program, and to assist them in expanding their activities to the limit of their resources in personnel and equipment.
2. To assist hospitals in the locality to organize, equip, and train Emergency Medical Field Units as outlined in Medical Division Bulletin No. 1, "Emergency Medical Service for Civilian Defense."



## ***Equipment and Operation of Emergency Medical Field Units***

3. To inspect and select sites for the establishment of Casualty Stations.
4. To make a spot map of the locality, indicating the locations of hospitals, appropriate sites for Casualty Stations, and depots for storage of stretchers, collapsible cots, and blankets. The map should indicate the number of Emergency Medical Squads in each hospital. Copies of the map should be supplied to Control Centers, Police and Fire Departments, Health Department, local Red Cross Chapter, State Defense Council, Regional Director, Regional Medical Officer, and all cooperating hospitals.
5. To plan and establish adequate transportation service for casualties and medical personnel in consultation with local government departments, American Red Cross, and voluntary agencies.
6. To arrange with the local defense authority for field drills of Emergency Medical Units in collaboration with police and fire auxiliaries, disaster relief and canteen services of the American Red Cross, ambulance transport service, and other civilian defense units.
7. To make an inventory of hospital facilities in the locality and of the possibilities for their emergency expansion in bed capacity.
8. To assist the authorities charged with preparing plans for evacuation in making an inventory of hospitals, convalescent homes, sanatoria, hotels, and other structures within a radius of 50 to 100 miles which might be used as base hospitals to which patients in city institutions could be evacuated.
9. To assist the local volunteer office in establishing courses for volunteers in the fields of health, medical care, nursing, and related activities.
10. To stimulate recruitment of volunteers for Nurses' Aide courses of the American Red Cross, assist the local Red Cross chapter in establishing Training Centers for Volunteer Nurses' Aides at appropriate hospitals, and assist the Red Cross in placing Nurses' Aides with hospitals, clinics, health departments, and field nursing services after completion of training.
11. To assist the local Civilian Defense Volunteer Office in training and placing other volunteers in health and medical agencies in the community.
12. To stimulate and guide extension of first-aid training by qualified Red Cross instructors as widely as possible among the local population.
13. To stimulate and guide industrial plants, business establishments, and Government bureaus in the locality in the training and organization of effective first-aid detachments among the employees.
14. To collaborate with State and local health departments and through them with the Regional Sanitary Engineer in a comprehensive program for the protection of the community against emergency sanitary hazards.
15. To collaborate with local and State Defense Councils, Office of Civilian Defense, Federal Security Agency, Children's Bureau, and other local, State, and Federal authorities in the preparation of plans for evacuation, with particular attention to the medical needs of the population under such circumstances.
16. To keep the community and particularly the members of the health and medical professions and the participating official and voluntary organizations informed of the plans and activities of the local Emergency Medical Service.



## **GLOSSARY**

*of Terms used in publications of the Medical Division of the Office of Civilian Defense*

- Casualty Station.*—A site designated in advance for occupancy by an emergency medical squad in the event of a disaster in the vicinity.
- Decontamination Squad.*—A group of auxiliaries of the sanitation or other municipal department trained and equipped to decontaminate localities and structures in order to rid them of persistent chemical agents.
- Decontamination Station.*—A special type (or subdivision) of a Casualty Station for decontamination of both injured and uninjured persons contaminated with persistent war gases. This must be done before casualties are transferred to a hospital.
- Emergency Medical Field Unit.*—A group of physicians, nurses, orderlies, and volunteer nurses' aides organized, equipped, and trained for field casualty service in the event of a disaster.
- Emergency Medical Squad.*—A subdivision of a Field Unit, consisting of two or four physicians and an equal number of nurses and of nursing auxiliaries. A squad comprises the personnel required to operate a Casualty Station.
- Emergency Medical Team.*—A subdivision of a squad consisting of one physician, nurse, and one or more orderlies or nurses' aides. A team comprises the personnel required to operate an advanced First-Aid Post.
- First-Aid Detachment.*—A group of employees of an industrial plant, business establishment, or Government department who have been trained in first aid by the American Red Cross and organized under a detachment leader for service to other employees in the event of disaster.
- First-Aid Post.*—A site close to the scene of disaster which is occupied temporarily to administer emergency first aid, classify the casualties, and expedite their transfer to a hospital.
- Incident.*—Devastation of a building or area by explosive or incendiary bombs.
- Medical Depot.*—Site for the storage of stretchers, collapsible cots, blankets, and other heavy equipment intended for Casualty Stations; usually located at transportation centers, clinics, police and fire houses, and other places.
- Mobile First-Aid Post.*—A large enclosed truck or van constructed and equipped to serve as a First-Aid Post when no suitable structures are available in a devastated area.
- Rescue Squad.*—A specially trained group equipped with demolition tools for the extrication of casualties from wrecked buildings.
- Stretcher Team.*—A group of four or more volunteers who have been trained in first aid and stretcher bearing by the American Red Cross and who assist the Rescue Squad by transporting stretcher cases from the scene of a disaster to a First-Aid Post.

**IDENTIFICATION TAG**

**Name** .....  
                     (Surname)                      (Given name)

**Address** .....

**Age** .....

Male ☐ Catholic ☐ Single ☐ White ☐  
 Female ☐ Protestant ☐ Married ☐ Negro ☐  
                     Jewish ☐ Widowed ☐ Other ☐

**Person to be notified:**

**Name** .....

**Address** .....

**Phone** ..... **Relation** .....

**Where tagged** .....

**Date** ..... 194..... **Hour** ..... **M.**

**Diagnosis:**

**Treatment given:**

**Morphine** ..... **Tourniquet** .....

**Where sent** .....

**Signed** .....

**Organization** .....

FRONT

**BACK**

**SUPPLEMENTARY INFORMATION**

FIGURE 1

CASUALTY RECORD BOOK

NAME	ADDRESS	AGE	SEX	RACE	WHERE TAGGED	HOUR	DIAGNOSIS	TREATMENT	SENT TO	HOUR	DOCTOR

FIGURE 2

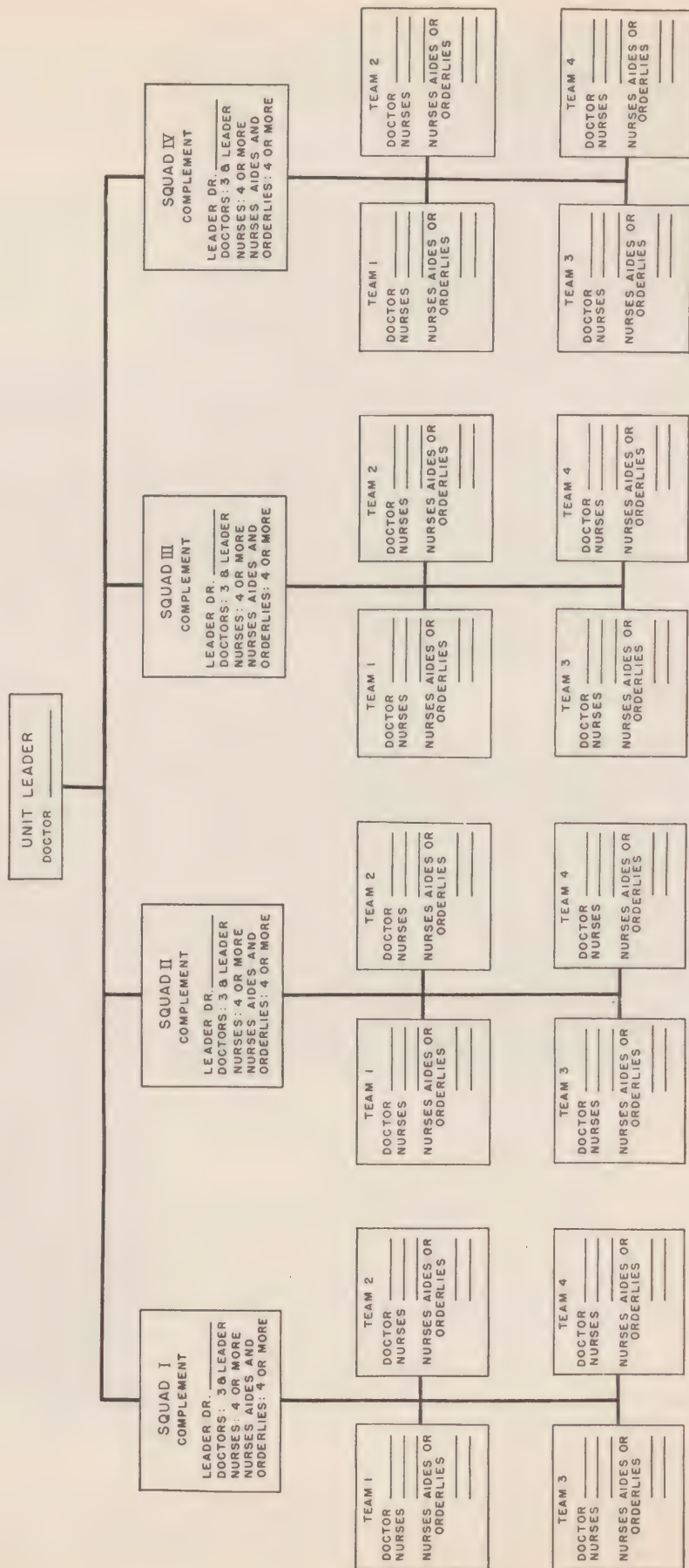


FIGURE 3



# Equipment and Operation of Emergency Medical Field Units

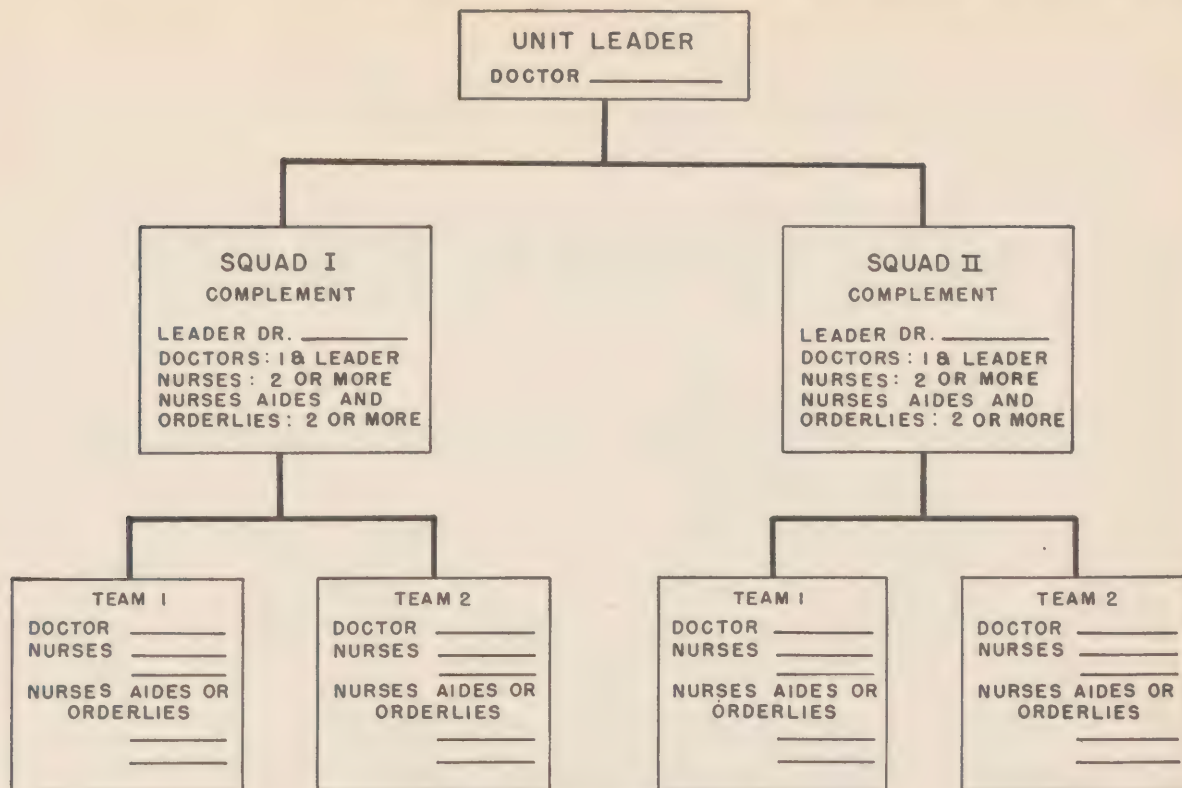


FIGURE 4

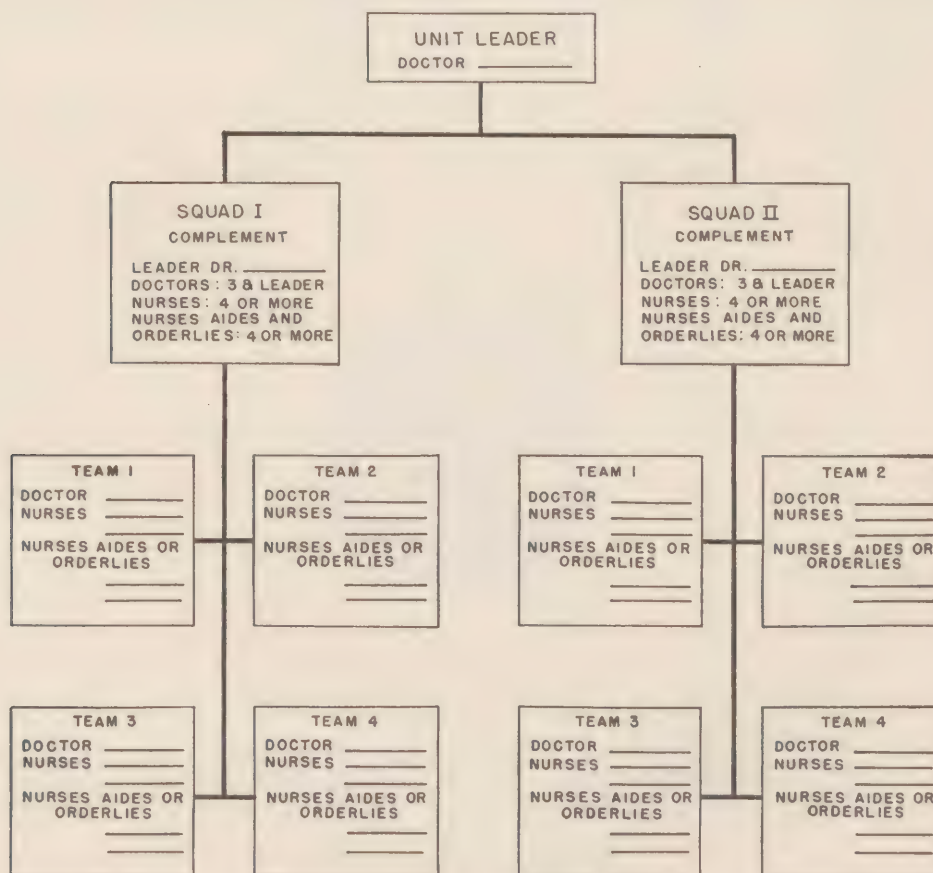


FIGURE 5

The organizational chart for the Field of Emergency is structured as follows:

- LOCAL DIRECTOR OF CIVILIAN DEFENSE**
  - COMMANDER CONTROL CENTER**
    - CHIEF OF EMERGENCY MEDICAL SERVICES**
      - MEDICAL ADVISORY COUNCIL** (Representing Health Dept., Medical Society, Nursing, Red Cross, Hospitals, etc.)
        - HEALTH DEPT.**
          - EMERGENCY PUBLIC HEALTH NURSING
          - WATER AND FOOD SANITATION
          - SHELTER SANITATION & EPIDEMIC CONTROL
        - VOLUNTARY AGENCIES** (Red Cross, Visiting Nurses Assns., etc.)
          - NURSE'S AIDE CORPS**
            - FIRST AID TRAINING**
              - EMERGENCY NURSING SERVICES**
      - HOSPITALS (FIELD UNITS)**
        - BASE HOSPITAL**
          - CLEARANCE HOSPITAL**
      - AMBULANCE UNITS**
        - CASUALTY STATIONS**
          - DECONTAMINATION STATIONS**
    - OTHER PROTECTIVE SERVICES (FIRE, POLICE, ETC.)**
      - TRANSPORT OFFICER**
        - VOLUNTEER MOTOR CORPS (RED CROSS, ETC.)**
          - AMBULANCE SERVICE**
      - AIR-RAID WARDENS**
      - RESCUE SQUADS**
      - DRIVERS CORPS**

**FIELD OF EMERGENCY**

- FIRST AID POSTS**
  - RESCUE SQUADS & STRETCHER TEAMS**

**LEGEND**

- LINE OF SERVICE
- LINE OF AUTHORITY

**FIGURE 6**

**A CIVILIAN DEFENSE**  
**VOLUNTEER OFFICE**

*An Official Arm of the Local Defense Council*

**WHAT IT IS**  
**HOW TO ORGANIZE IT**  
**WHAT IT DOES**



**UNITED STATES OFFICE OF CIVILIAN DEFENSE**

*Washington, D. C.*



*"Volunteer Offices are nerve centers of  
Civilian Defense work. I strongly urge  
their establishment under local Defense  
Councils as rapidly as possible."*

*Thomas Roosevelt*

Assistant Director.



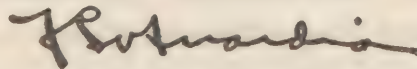
## FOREWORD

"We are at war, and there is something for everyone to do. . . .

"If you are anxious to do something, you can volunteer for any kind of needed service. Call your local Civilian Defense Volunteer Office or local Defense Council or any firehouse or police station. Both men and women are needed. The volunteer participation committee has a very important program . . .

"We are comforted by the fine leadership of the President of the United States. The world today knows that we are a united people. The American people have spoken through their Congress. We are ready. We are firm. We are determined. I ask all to cooperate."

DECEMBER 8, 1941.



*U. S. Director of Civilian Defense.*

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**NOTE:** *The contents of this manual are suggestive, not mandatory.*

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UNITED STATES OFFICE OF CIVILIAN DEFENSE, WASHINGTON, D. C.



## WHAT IT IS

A Civilian Defense Volunteer Office is the community's clearing house for volunteers and volunteer work. It is an official arm of the local Defense Council and operates as the vital link between the Council and the men and women in each community who wish to give of their time and talent during the war. It recruits and enrolls men and women who wish to volunteer their service for Civilian Defense either in the protection programs or in those many programs which give service of all types to citizens; it refers these individuals to the training courses most suitable for their abilities, or directly to volunteer jobs.

A Civilian Defense Volunteer Office is the answer to the need for finding the volunteer more power to help to meet the many new problems which have arisen in communities throughout the country as a result of the war effort. It is the effective answer to the cry, "What can I do to help?"

## HOW TO ORGANIZE IT . . . . .

### **First steps**

The local Defense Council should initiate the formation of a Volunteer Office. However, interested citizens or groups of citizens may offer to assist the Defense Council with the organization of an office. Every State now has a *State* Defense Council. If no *local* Defense Council exists, interested citizens should urge the Mayor or local governmental officials to establish such a Council with a Volunteer Office as one of its local Defense units. Until local Defense Councils are established, interested citizens can set up provisional Volunteer Offices with the understanding that the Office will be attached to the local Defense Council when it is created. Volunteer Offices should be organized with the knowledge and approval of State Defense Councils. Before a local Defense Council organizes a Volunteer Office, the following steps are advised:

- Make a careful check to see whether a Civilian Defense Volunteer Office is already in process of formation.
- Find out whether the community already has a clearing house for volunteer work, such as a "Central Volunteer Bureau," a "Volunteer Service Bureau," or a "Volunteer Department of the Council of Social Agencies." If so, local Defense Councils are urged to invite such a bureau to consider the advisability of adopting a program in line with this Manual and adopting the official name "Civilian Defense Volunteer Office."
- Secure the cooperation of any social planning council which may exist in the community.
- Interest men's and women's civic organizations, Chambers of Commerce, service clubs, women's clubs, labor groups, church groups, professional groups, business groups, fraternal orders, etc.
- Form, with the cooperation of the social planning council, if one exists, a widely representative organizing committee and include representation of both the Defense Council and the social planning council.
- Get the organizing committee to draft a plan for creating the Volunteer Office; the plan should include arrangements for selection of a continuing board to determine major policies and should also provide for financial support of the Office.
- When the plan is ready, call a representative meeting—representative both of those who will volunteer and of departments and agencies which will use volunteers—to discuss the plan.
- When the plan is accepted, proceed in the approved manner with selection of the board.

## **Governing board or committee**

As the Volunteer Office is a coordinating service belonging to the whole community, it is administered by a board composed of men and women, representative, as far as practical, of all interested community groups—women's organizations, labor organizations, men's civic organizations, patriotic organizations, church groups, youth groups, social-agency boards, fraternal orders, etc. The board should be strictly nonpolitical in character. It should include a liaison representative from both the board of the Defense Council and that of the social planning council.

When the number of interested community groups is too large to make it practical to build an administrative board on a representative basis, an advisory board should be made up of these people. From this board, an executive committee should be elected to be responsible for administration. In rural counties, where there may be fewer organizations to represent, care should be taken to have the board representative of all interested groups.

The board or the executive committee has the usual officers and standing committees on Finance and Publicity.

The viewpoint of officials and professional people—city officials, social workers, doctors, nurses, dieticians, and others in fields which might use volunteers—should be secured through an advisory committee.

Where the Volunteer Office serves an entire county in which there are incorporated cities, towns, and villages, no attempt should be made to represent individual cities or towns on the board. This representation can come through branch offices which handle enrollment and referral of volunteers in the various localities.

## **Committees**

A large paid staff for a Volunteer Office is not recommended even in the case of large metropolitan areas. Since, effective operation of a Volunteer Office requires extensive planning, the board or the executive committee should appoint at least the following three committees (the chairman and the director serving as a member of each, *ex officio*):

1. Placement Committee—which first secures facts about needs which can be met by volunteers and then refers volunteers to jobs and training courses to meet these needs.
2. Training Course Committee—which lists the training for Civilian Protection Services, clears existing training courses and makes arrangements for the development of needed courses in the various fields of community service.
3. Recruiting and Enrollment Committee—which is responsible for recruiting and enrolling volunteers to fill the jobs found.

These groups plan the above phases of the work, and arrange the training of the volunteer staff who do the greater part of the work of the volunteer offices. Suggestions for the type of training needed are given under *Staff*.

## **Staff director**

A Volunteer Office should, if it is to function effectively, have a full-time director. The duties of the director consist chiefly in organizing and managing the Volunteer Office and guiding its relationships. The principal qualifications are, therefore, administrative ability; knowledge of community organization; initiative; leadership; ability to make good contacts with people.

Small communities, such as towns or rural counties, may be able to secure a well-qualified volunteer who will serve as director. Large metropolitan areas, on the other hand, may have to pay an executive.



Such executives may be found among men or women who have had experience in a council of social agencies, a personnel bureau, or as a college dean or counselor. The board of the Volunteer Office should endeavor to persuade such persons to make their skill available in this emergency.

Other sources for a director are public and private social agencies; the public employment service, which might have on its staff workers who are ready for promotion to an executive position or which might have suitable candidates enrolled with it; and, in larger cities, any private employment service which specializes in handling executive personnel.

### **Other staff**

A Volunteer Office should also have at least one full-time clerical worker. Where branch offices are necessary, there should be in each branch a full-time clerical worker who has executive ability. In small communities such workers may often be persuaded to serve on a voluntary basis, but in large metropolitan areas the full-time clerical workers will more often have to be paid.

Volunteer workers may be used very effectively to carry out the work planned by the Placement Committee and the Recruiting and Enrollment Committee.

The course for training the Placement Committee workers should cover the following topics:

1. Community needs and facilities.
2. The Civilian Defense Volunteer Office—what it is—what it does.
3. Standards of volunteer service.
4. Review of organized community services.
5. How to interview department and agency heads.
6. How to fill out the forms for getting facts about jobs.
7. How to use the files of the Volunteer Office.
8. How to interview a volunteer to check his or her suitability for the job, including the proper approach to a volunteer.
9. How to maintain good relationships with the departments or agencies to which volunteers are referred.
10. How to use referral forms and how to record a placement.

The course for training the Recruiting and Enrollment Committee workers should cover the following topics:

1. Community needs and facilities.
2. The Civilian Defense Volunteer Office—what it is—what it does.
3. Standards of volunteer service.
4. Types of volunteer jobs and qualifications for workers in each case.
5. Review of organized membership groups in the community.
6. Methods of recruiting.
7. How to interview prospective volunteers.
8. How to fill out enrollment cards.

Where volunteers are being trained simultaneously to do the above-mentioned jobs, both time and effort can be saved by having joint sessions of the training courses when basic subject matter is being dealt with. For example, there could be a joint session on "The Civilian Defense Volunteer Office—what it is—what it does." Similarly, there could be a joint session on "Standards of volunteer service." Such economizing should be avoided, however, when a joint session results in bringing together a group larger than 35 or 40, because in such a group discussion is virtually impossible.



In sizable cities where there are many organized services, it will be relatively easy to get leadership for such courses. Rural communities, having less easy access to organized services, should turn to the county welfare department and the extension department of the State University to furnish leadership for training volunteers to do their work.

### ***Quarters and equipment***

The size and type of the community affects the quarters needed by a Volunteer Office. Whenever possible, the board should try to get rent-free quarters.

In a community of less than 500,000 population there should be no need for more than one Volunteer Office, unless the residential section is so widely scattered as to make branches advisable. In communities of over 500,000 and in densely populated counties, however, there is need for branch offices. There should usually be a branch office in each local university or college. The board of the Volunteer Office should determine how many branches are needed and what locations would be strategic. Both the central office and the branches must have space which provides adequately for privacy in interviewing and for necessary filing equipment.

In the case of both the central office and branches, quarters should be bright and attractive, decorated by a flag, defense posters, and any other material which will aid in making civilians realize the urgency of the defense program. A little time and thought by a group of volunteers can produce most desirable looking quarters without necessitating any large outlay of funds.

The matter of adequate files for Volunteer Offices is extremely important. When a hundred volunteers must be made available immediately to a local civilian protection program, the files must be geared to yielding such information speedily. Moreover, this operation must be performed with a minimum of disorganization to the total file, so that the Volunteer Office will be ready to handle a call for fifty additional volunteers which may come in shortly thereafter.

It is impossible in a manual of this sort to discuss in detail the filing system of a Volunteer Office. The various branches of the United States Employment Service, located in all States and in over 1,500 localities, have personnel who are expert in the matter of filing. It is therefore suggested that Volunteer Offices secure advice from their nearest public employment office. Using this group is doubly wise, because they are near at hand for additional advice when it is needed. This manual contains a list of the forms usually needed in Volunteer Service Offices and displays two of the forms. This material can be used as a basis for discussion in the conference with the public employment office. Care has been taken to make the suggested forms simple. If Volunteer Offices use their own forms, they should keep them simple.

### ***Budget***

If the community is a very small city or town, or a rural county, the cost of operating a Volunteer Office may be virtually nothing. Some organization, like the public school or the Red Cross, will probably lend someone to direct the office, and the detailed work will be carried on by the volunteers whom the director will train. In larger communities, local business firms with trained personnel directors may be persuaded to loan them to organize and direct the Volunteer Office. Quarters may be loaned and so may furniture and filing equipment. The only cash expenditures may be for such items as telephone, stationery and printing, postage, and office supplies. In many communities even printing may be donated.

In large communities where it is impossible to borrow a qualified director, a paid director will be required, for the Volunteer Office must be organized and operated on a businesslike basis. In such communities, where branch offices are necessary, a director, a paid clerical worker, and a paid clerk in each branch are essential. Funds for operation will have to be secured, even though quarters, furniture, and filing equipment have all been donated.

When funds must be secured, the board of the Volunteer Office should request the local Defense Council or the mayor for support. It is also well to request support from civic and service organizations, women's organizations, community chests, etc. When securing support from organizations of this sort, it is preferable to have a number of them, rather than one, contribute, so that the Volunteer Office will not be thought of as the project of any one group.

It is not practical to discuss here the amount needed to operate a Volunteer Office because this figure will vary greatly in relation to the size of the community and the amount of paid staff needed.

## WHAT IT DOES . . . . .

### ***Discovers community needs for volunteer services***

In total war it is imperative for volunteers to serve in the protective programs such as air raid warden service, bomb squads, rescue squads, etc. England's experience has amply demonstrated, however, that if communities and citizens are to survive total war, it is of equal importance for volunteers to work in community service programs where children and families and the sick are cared for. Consumers must be kept informed; facts concerning nutritional values of food must be given out; there must be widespread discussion of important questions of the day. Accordingly, it is essential for a Volunteer Office to promote volunteer service in every phase of community activity. The Placement Committee should list and describe work opportunities in all of the following fields of service:

#### ***Civilian protection programs***

Services such as:

- a. Auxiliary Firemen.
- b. Rescue Squads.
- c. Auxiliary Police.
- d. Bomb Squads.
- e. Fire Watchers.
- f. Feeding and Housing.
- g. Emergency Medical Personnel.
- h. Nurses' Aides.
- i. Demolition and Clearance Crews.
- j. Road Repair Crews.
- k. Decontamination Squads.
- l. Messengers.
- m. Drivers Corps.
- n. Staff Corps.
- o. Other.

#### ***Special programs created by the emergency:***

USO Programs for Armed Forces.  
Programs for Defense Workers and their Families.  
Salvage Programs.  
Sale of Defense Savings Bonds.  
Democracy Programs.  
Programs in Liaison with War Relief Organizations, etc.



### ***Community programs intensified by the emergency***

Health.  
Nutrition.  
Consumer Education and Protection.  
Family Security.  
Child Welfare.  
Recreation.  
Education.  
Social Protection, etc.

The Placement Committee should, when discovering volunteer jobs, also learn for which jobs training is needed and whether adequate training is already available or must be developed. This information it passes on to the Training Course Committee.

The Office of Civilian Defense is issuing, in cooperation with the Office of Defense Health and Welfare Services and other Federal Departments, manuals listing and describing what volunteers can do in various fields of community service and what training they should have. These manuals will be of great assistance to Volunteer Offices in ascertaining the needs of the community and providing ways in which volunteers can help to meet them.

In promoting the wise use of volunteers in community service agencies, the Placement Committee should urge all organizations or agencies to take the following steps in order to provide a sound foundation for the building of a good volunteer program:

Appoint a member of the board as chairman of volunteers.

Assign a staff member or staff members to supervise volunteers.

Analyze the total work to see what jobs are suitable for volunteers, preparing in the case of each job a description covering duties, time required, qualifications necessary—including special training—and arrangements for supervision.

In large cities or suburban counties where the Volunteer Office is set up with branch offices, the job of discovering and promoting jobs for volunteers belongs entirely to the central office. If a branch office should learn of jobs where volunteers are wanted, it should notify the central office in order that the director, or the volunteers trained to do job-finding, may check the opportunity to determine whether the work is suitable for volunteers and whether the training and supervision are adequate.

#### ***Clears training program***

The Placement Committee secures much information on training when it locates jobs. The Training Course Committee must be sure that all training courses are listed, both those for civilian protection services and those for the various fields of community service. The Training Course Committee should make arrangements for the development of needed courses in the various fields of community service so that when volunteers enroll they may be directed at once to any training which is necessary for the job in which they wish to be placed.

If the study of the local training program reveals that important types of training are lacking, the Training Course Committee should take the initiative in making arrangements for the proper organizations to offer such additional courses and apprentice training as the community may need. If the missing part of the training program is in a field where a nationally standardized course has been developed, the Training Course Committee should urge appropriate local organizations to offer such courses. If the training needed is purely local in character, the Training Course Committee should persuade whatever local organizations are best fitted through personnel and equipment to take on this responsibility.

In large communities where there are branch offices the entire responsibility for clearing training programs should be lodged with the central office.



## ***Recruits and enrolls volunteers***

A Volunteer Office must recruit actively so as to make available to its Civilian Defense program the best volunteer skill in the community. In order that there should be one central index of the skills of the community's available manpower for possible use in an emergency, it is essential that organizations who already have lists of volunteers do one of three things: (1) Give duplicate registration cards to the Volunteer Office; (2) strongly urge their volunteers to register in person at the Volunteer Office; or (3) have one of the Placement Secretaries of the Volunteer Office come to the organization and officially register its volunteers. Individuals who are already volunteering their time should register that fact when they register at the Volunteer Office. If the organization and the volunteer so desire, the card may indicate the fact that the volunteer will be called for further work only in case of a real emergency in the community.

Recruiting plans should be made at the central office even if a community has branch offices. Much recruiting could be done through contacts with organized groups—professional organizations, civic organizations, industrial groups, labor groups, church groups, women's groups, etc. Such contacts are more easily made from the central office.

Enrollment should be decentralized, particularly if the city is a large one. Enrollment centers should be set up temporarily in schools, fire houses, or other centrally located facilities and in addition staff from the central office should be sent to industries, clubs, etc. to take enrollment there. Enrollment, is, of course, continuous after the initial period. It then takes place either at the central office or branch offices depending upon the plan of organization. In communities which are small enough to have only a central office, enrollment should take place as soon as adequate staff has been trained. The same may be true in communities which have branch offices. However, in such communities it may be impossible to secure sufficiently well-trained volunteers to man all branches at once. In this case, the expedient thing to do is to stagger the initial enrollment, moving the well-trained staff from branch to branch until the entire job is done.

Branch offices should send duplicates of all enrollment cards to the central office. This is important in order that:

There may be one place of information regarding the vital tasks volunteers are prepared to do.

The central office may know in emergencies where to find quickly special types of ability.

## ***Refers volunteers to jobs or training courses***

After the groundwork for operation has been laid, the Placement Committee can begin its task of connecting volunteers with training courses or jobs. This is the heart of the work.

Volunteers are referred, not assigned. Both the divisions under the Citizens' Defense Corps and the various community organizations and agencies using volunteers have the right to accept or reject any volunteer sent to them.

There are two principles which are basic to effective placement of volunteers. Every Volunteer Office should heed them. They are:

1. That volunteers should be placed where they are best fitted to serve, following the same principles which hold for good placement of paid workers.
2. That volunteer service which is of a part-time or temporary nature should be supplementary to that of a full-time staff, whether paid or volunteer, so that there may be continuity in the program.

Referral to training courses can be made immediately after enrollment with the understanding that when the quota for a class becomes filled, volunteers may have to be placed in a second or third section of a course.

In communities where there is only a central office, referral of qualified persons to jobs may be made immediately after enrollment. In communities where branch offices are necessary, referral to jobs at the time of enrollment is possible only when those jobs are to be done within the area which the branch serves. Only then is there no possibility of duplication between branches. In the case of other jobs, branches may make referrals only when the central office requests them to do so. In such large-scale placement as Volunteer Offices are expected to carry on, it is not practical to give every volunteer an interview in addition to the one at the time of enrollment. Volunteers should be referred without subsequent interview to all temporary jobs where large numbers are needed, and to other large-scale activities where the service is to be of a relatively short duration. However, those volunteers who are to fill regular long-time jobs where it is of the utmost importance for the volunteer to be carefully selected, should be given an additional interview.

### ***Maintains good standards of service***

A Volunteer Office should communicate periodically with the departments and agencies where it places volunteers. This is essential in order that the volunteer may find the most satisfactory channel of service and the agency the most satisfactory workers. In instances where the volunteer or agency is not satisfied a change should be made. It is good neither for the morale of the volunteer nor the agency to allow a person to remain as "a square peg in a round hole."

It is neither practical nor expedient in large-scale placement of civilians, however, to secure individual reports on the work of each volunteer. An informal contact with each agency is all that is possible. Wherever practical, individual workers in the Volunteer Office should be assigned responsibility for keeping in touch with specific groups.

### ***Keeps the public informed***

The community must know of the facilities and work of the Volunteer Office, if it is to be of maximum usefulness. It is, therefore, highly important that through the press, on the air, through speakers before organizations, and through informative leaflets and bulletins, the work of the Volunteer Office and the ways in which volunteers are serving be kept constantly before the public. Publicity of this sort stimulates civilians to volunteer and agencies to develop additional ways in which volunteers may serve. There is need for a carefully worked out plan. The publicity committee of the Volunteer Office does this job in cooperation with the Defense Council's publicity committee.

### ***Makes reports of its work***

A Volunteer Office must report to the local Defense Council such facts as are requested by the Regional Office of Civilian Defense through the State Defense Council and at such intervals as the Regional Office requires.

## **VOLUNTEER WORK OPPORTUNITIES IN CIVILIAN DEFENSE**

It must be remembered, that the word "volunteer" is used in this manual to mean a person who gives service without pay. Volunteers supplement the services of paid staff. They should be oriented, trained and supervised. A volunteer is not necessarily an untrained person. When nurses, social workers, nutritionists, occupational therapists, recreation leaders, educators, etc., volunteer their services, encourage them to do so. Such volunteers are especially helpful in training and supervising other volunteers.

The following list indicates types of service, playing a major part in strengthening the home front, which volunteers can perform. It has been prepared by the Federal agencies active in each field. It does not cover every possible activity. Furthermore, all of these activities will not need to be performed in every community.



# **VOLUNTEER OPPORTUNITIES IN:**

## **I. Civilian Protection Programs**

1. Act as auxiliary firemen.
2. Serve in rescue squads.
3. Act as auxiliary policemen.
4. Serve in bomb squads.
5. Act as fire watchers.
6. Serve in emergency food and housing corps.
7. Serve as auxiliary medical personnel.
8. Give nurses' aides service.
9. Serve in demolition and clearance crews.
10. Serve in road repair crews.
11. Serve in decontamination squads.
12. Give messenger service.
13. Serve in drivers' units.
14. Serve in staff corps.
15. Other.

## **II. Special Services for Armed Forces and Defense Industry Workers**

1. Assist in information centers for men in uniform and families.
2. List restaurants and lodgings with prices.
3. Prepare a guide on community facilities.
4. Make arrangements for week-end dormitory facilities.
5. Investigate room vacancies and maintain a room registry.
6. Mend clothes of men in uniform at camp centers.
7. Secure home town editions of papers from local editors.
8. Prepare a list of current amusements.
9. Prepare a list of available recreation facilities.
10. Organize athletic contests; plan outings; provide increased recreation facilities in the community.
11. Prepare a magazine and book collection for camp libraries and community centers.
12. Serve as hostesses, chaperones, dance partners, etc.
13. Assist in recreation programs in service men's clubs and similar centers for defense workers.
14. Arrange a home hospitality program for men in uniform.
15. Arrange special transportation for community events.
16. Arrange for guest tickets or price reduction for community events.
17. Provide transportation facilities for defense industry workers, where none exist, to their place of employment and for men from the camps to the nearby towns.
18. Provide children of defense workers who live in trailers or in housing projects with opportunities for play, story telling, and dramatization under suitable conditions.
19. Provide supervised transportation for these children to and from playgrounds and other recreation activities.

## **III. Consumer Programs**

### **A. Informational and Educational Programs.**

#### **1. Consumer centers.**

Assist in establishing and operating consumer centers. (*Handbook on National Defense Consumer Information Center* available upon request)



from the Consumer Division, Office of Price Administration, Washington, D. C.) Volunteers, both professional and nonprofessional are needed to promote, organize, and administer programs; to teach and provide technical consultant services on consumer problems; and to learn wise buying, conservation, and use of substitutes in order to apply such knowledge in their own homes.

In the consumer centers, volunteers will:

- a. Assemble, prepare, and distribute informational materials on supplies, substitutes, wise buying, and other consumer problems within the center and to neighborhood groups.
  - b. Receive, analyze, and summarize consumer reports.
  - c. Advise individual consumers on their budgeting and buying problems.
  - d. Assist organizations with their consumer educational programs and conduct classes and discussions.
  - e. Guide consumers in the use of available services of Federal, State, and local agencies which can serve consumers.
2. *Public forums, discussions, and radio programs.*
- a. Promote and participate in public forums and study groups on food buying problems, budgeting, intelligent family shopping, and on protective and economic public services directly affecting consumers, such as weights and measures inspection, milk ordinances, food and drug control.
  - b. Promote a local market news broadcast for consumers.
3. *Consumer programs in neighborhoods and organizations.*
- Promote and participate in consumer classes, discussion groups, and projects within organizations and neighborhoods.

**B. Conservation Programs.**

1. Join in community food conservation programs. Take stock of local fruit and vegetable surpluses and arrange for collection and distribution in fresh or preserved form through school lunches, community kitchens, etc.
2. Work with neighbors to make best use of existing equipment such as washing machines and automobiles, and to achieve housekeeping economies.
3. Form groups to learn how to keep things in repair.

**C. Federal, State, and Local Consumer Protection Programs.**

1. See that such consumer protection laws are enforced as those relating to weights and measures, safety, sanitation, food and drugs, and anti-profiteering.
2. See that consumer services are supplied where needed, such as school lunches, low-rent housing, low-cost milk distribution, and municipal markets.

**IV. Health Programs.**

**A. Hospitals, public and private, general and specialized.**

**1. In the out-patient department.**

Operate an appointment system for patients.

Act as guides for patients referred to other clinics or sections of the hospital.

Give clerical assistance, take notes from doctors, or give messenger service to doctors, nurses, clinic supervisors, etc.

- Transport patients.
- Weigh and measure patients.
- Assist with mothers' clubs, teach certain aspects of child care.
- 2. *In the wards.*
  - Give nurse's-aide service (after passing Red Cross nurse's-aide course) to assist registered nurses so that they may extend their services to more patients.
  - Perform messenger service for patients and personal services.
  - Escort patients to other hospital departments, such as X-ray physiotherapy, etc.
  - Give routine information on patient's condition in answer to telephone inquiry.
  - Help to initiate and maintain recreational program.
- 3. *At the reception desk.*
  - Issue passes to visitors.
  - Direct or guide visitors within the hospital.
  - Give information about visiting hours, transit routes, and such matters.
- 4. *In the patients' library.*
  - Inaugurate a library if none exists; catalogue books; review and distribute books and magazines to patients.
- 5. *In the occupational therapy department.*
  - Collect necessary materials.
  - Teach crafts.
  - Assist professional therapists with simple aspects of treatment.
- 6. *In the supply room.*
  - Make surgical dressings; fold supplies; mend linen and hospital gowns.
- 7. *In the social service department.*
  - Make arrangements for convalescent care, appliances, etc.
  - Give messenger service to case workers.
  - Transport patients.
  - Assist case workers.
- B. *Clinics* of all kinds—whether operated independently under city health departments, under visiting nursing associations, tuberculosis and health associations, or other auspices.
  - (For detailed volunteer opportunities see *Hospitals—Out-patient department, reception desk, social service department, nurses' aide service.*)
- C. *Convalescent homes, institutions for the handicapped* (children and adults).
  - Organize play services of various types; conduct story-telling hours for children; lead singing groups; arts and crafts groups; etc.
  - Write letters.
  - Supply transportation.
  - Give clerical assistance and messenger service to doctors and nurses.
  - Operate a library.
  - Conduct recreation program.
- D. *Tuberculosis and health associations and cancer societies.*
  - Promote immunization campaign.
  - Assist in clinics operated by the associations (for details, see *Clinics*).



Transport patients and staff.

Show health education movies to groups; speak before groups or on radio.

**E. Public health nursing programs.**

Give nurse's aide service (after passing Red Cross nurse's aide course) to assist the public health nurse.

Assist with mothers' classes.

Assist in clinics.

Give clerical assistance.

Teach cooking to patients' families.

Give recreational work to patients, such as knitting, basketry, etc.

Make surgical supplies and layettes.

Give motor service.

Develop a library and other services for shut-ins.

Speak before groups or on radio on matters of health education.

**F. City or county health departments.**

Give nurse's aide service (after passing Red Cross nurse's aide course) in baby health clinics, prenatal clinics, field nursing services.

Man information centers on health facilities.

Give motor service.

Assist in clinics—as indicated under *Hospitals*.

Teach first aid.

Promote immunization campaigns.

Promote venereal disease control, especially in defense areas.

Work on education programs for better nutrition.

Assist laboratory technicians.

**V. Nutrition Programs.**

In the National Nutrition Program, activities are being organized in all parts of the country under the auspices of State and local nutrition committees. There are two types of volunteers, the professionally trained volunteer and the nonprofessional volunteer.

The professional volunteer may:

A. Serve as consultant and adviser on all nutrition projects.

B. Teach refresher and other courses in nutrition.

C. Lecture on nutrition subject matter.

The nonprofessional volunteer may be one of two groups:

I. Those who have taken special courses in nutrition.

A. Nutrition Aide: has completed a course satisfactory to the State nutrition committee of at least 20 hours' work in the fundamentals of nutrition and their application to community needs. Such courses are given by the American Red Cross, State and county Extension Services, State and local school systems, and universities or colleges.

A Nutrition Aide may:

1. Participate in group feeding projects.

2. Participate in cooking demonstrations.

3. Advise on food buying and preparation.

4. Set up exhibits.

5. Assist in classes.

6. Speak on nontechnical subjects.



II. Those who have administrative ability or special skills. They may:

1. Assist in organizing and administering the program

Group Feeding Projects

School Lunches

Cooperative Kitchens

Playgrounds

Recreation Centers

Defense Areas

Industrial Centers

Settlement Houses

Courses, Classes, Lectures

Consultation Services

Equipment Pools

Fund Raising

2. Publicize the nutrition program

Press

Radio

Posters, Exhibits

Films

3. Assist in promoting economic assistance projects

School Lunches

Low-cost Milk Projects

Cooperative Storage Plants

Community Gardens, Canning Projects

Food Stamp Plan

4. Carry out the machinery of the program

Clerical work

Transportation

Photography

Exhibit Preparation

Poster Making

Gardening

Food Preparation and Service

Library Service

**VI. Democracy Programs.**

1. Develop forums or "town hall meetings" discussing local, national, and international topics, etc.
2. Develop prodemocracy programs, including essay contests, poster contests, speech contests.
3. Arrange for library exhibits to coincide with topics under discussion (see above); for portable book exhibits at place of meeting; for traveling book exhibits on democracy and community problems.
4. Sponsor activities which will bring people of different nationalities together—including discussion programs, pageants, etc.
5. Establish classes in English, American history, and citizenship.
6. Form classes to study local government.
7. Work for improved intergroup relations.
8. Work on committees concerned with promoting and safeguarding civil liberties.

9. Work on programs for salvaging needed materials.
10. Work on campaign promoting sale of defense bonds and stamps.

## **VII. Education.**

### **A. Public schools.**

#### **1. General.**

Assist in testing sight.

Assist in testing hearing (audiometer).

Give motor service.

Give clerical service.

Assist in the conduct of parent-teacher programs aimed at physical preparation of the pre-school child for school life.

Assist health authorities in the schools during immunization campaigns; also during outbreaks of children's diseases.

Assist school health workers in conducting the health examination of school children and the follow-up of those found in need of medical attention.

Teach classes in home hygiene and care of the sick.

Teach classes in first aid.

Organize and conduct, when authorized by defense authorities, "collection campaigns" that may contribute to the supply of materials for defense purposes of which there is a shortage; provided that the campaign is such that it makes it advisable for the participation of school children.

Conduct a clean-up campaign for school grounds and individual homes; improve school ground areas.

#### **2. In the visiting teacher department.**

Aid case workers by friendly visiting and assisting with special outings for children.

Tutor sick or retarded children.

Take children to and from clinics or special schools.

Give clerical assistance.

#### **3. In the vocational guidance department.**

Aid counselors in interviewing and following up children.

Collect occupational information.

Make studies of special groups of out-of-school youth.

Give clerical assistance.

#### **4. In classes for handicapped children.**

Assist in the conduct of classes for the crippled, the partially blind, the partially deaf, mentally deficient, tuberculous, cardiac, and other children generally found in special classes.

Teach crafts.

Tutor bed-ridden children.

Teach Braille; copy books in Braille. (See Red Cross.)

#### **5. In the school lunch department.**

Aid the manager or dietitian.

Give clerical assistance.

Assist in service.

#### **6. In small schools that do not have lunchroom facilities.**

Cooperate with local nutrition committees by:

Helping to plan menus in terms of supplies available.



Discovering what types of morning and evening meals the children have as a basis for planning the school lunch.

Helping to prepare a hot lunch.

Sending home to parents copies of the school lunch menus.

### **VIII. Character Building, Recreation, and Informal Education.**

**A. Public recreation departments; public school recreation centers; settlement houses; libraries; community centers; local units of national agencies such as Boy Scouts, Girl Scouts, Campfire Girls, Y. M. C. A., Y. W. C. A., church groups, etc.** In such agencies, the volunteer jobs related to the various types of activities are relatively the same. The principal ones are:

**1. In air-raid shelters.**

Lead games and activities.

**2. On playgrounds.**

Lead active games, lead quiet games, tell stories, coach athletics. Act as life savers in swimming pools.

**3. In clubs and classes.**

Act as leaders for all sorts of interest groups, such as sewing, cooking, art, music, drama, crafts, etc.

Act as leaders for adult discussion groups on current topics.

Teach a variety of subjects, such as current events, citizenship, art and music appreciation, etc.

Arrange special activities.

**4. In libraries.**

Organize book drives; sort and arrange books, pamphlets, clippings, and pictures.

Secure and furnish a suitable reading room in areas without adequate library facilities.

Act as custodian of books in areas without adequate library facilities.

Give radio talks, book talks, and arrange forums to encourage reading of books related to the national defense program and the American way of life.

Transport books to outlying districts, welfare organizations, and to industrial plants.

Assist librarian, give clerical assistance, arrange exhibits, lead discussion groups on books read by children.

**5. In administration.**

Give clerical assistance, assist with publicity, keep clipping file, make statistical reports.

**B. Special programs for physical fitness.**

Assist as individuals and in group efforts to build hard bodies with sound nerves for resistance to prolonged strain.

### **IX. Programs of Family Security, Child Care, and Service to Single Persons.**

**A. Protective Agencies,** including social protection programs in defense areas. (Same general services as Private Family and Children's Agencies, see below.)

**1. In Service Centers** in defense areas where girls and women receive temporary care and social assistance while working out their individual difficulties.

Help locate available buildings and furnishings.

Give clerical assistance.



- Supervise or arrange recreation, as library, movies, games.
- Plan special parties.
- Collect magazines and books.
- Take patients to clinics.
- B. *Day Nurseries*—especially those near defense industries using women workers.
  - Supervise play; lead clubs; teach dancing, music, crafts, etc.
  - Help with physical care.
  - Tell stories or read to children.
  - Arrange special parties—birthday, Christmas, etc.
  - Give clerical assistance.
- C. *Nursery Schools*.
  - (Same general services as Day Nurseries.)
- D. *Private Family and Children's Case-work Agencies*.
  - Make friendly visits to aged, blind, shut-ins, refugees, etc.
  - Give motor service.
  - Accompany children or handicapped persons to clinics.
  - Tutor handicapped or specially gifted children.
  - Shop for children or handicapped persons.
  - Gather furniture or household equipment to rehabilitate families.
  - Study food requirements in relation to budget requirements.
  - Cooperate with local nutrition committees in working out low-cost diets.
  - Operate used-clothing shops.
  - Verify official records—statistical, school, etc.
  - Tabulate information on community resources for use of clients and staff members.
  - Give clerical assistance.
  - Answer telephone or operate switchboard.
  - Gather and tabulate factual data from agency records.
  - Act as receptionist, receiving clients, directing to right source, taking preliminary information, etc.
- E. *Departments of Public Welfare*.
  - Because of the legal foundation of these agencies, certain responsibilities, such as establishing eligibility, determining the amount of the grant, etc., must be exclusively the responsibility of the paid staff. However, many of the volunteer services now rendered in private family and children's agencies point to possible opportunities for volunteer service in a public department. Such service would assist the paid staff and make the client's contacts with the agency of a more helpful and beneficial nature. One particularly valuable contribution of volunteers in public welfare is public interpretation.
  - (Volunteer opportunities under these agencies are the same in general as those listed above under Private Family and Children's Agencies.)
- F. *Traveler's Aid Societies*.
  - (Same general services as private family and children's agencies.) Assist in information services in terminals and railway stations. Provide recreation for children between train connections.
- G. *Legal Aid Societies*.
  - Give legal advice and help to clients unable to pay for such counsel. (Lawyers only qualify.)
  - Give clerical assistance.

**H. Probation and Parole.**

- Assist probation officers, parole advisers, etc.
- Act as personal, friendly adviser as "big brother" or "big sister."
- Give clerical assistance.
- Take children to clinics.

**I. Institutions for Children.**

- Give clerical assistance.
- Act as receptionist.
- Supervise recreation; direct dramatics; teach music, art, dancing, crafts. Read to children and tell stories.
- Arrange outside recreation, such as drives and trips to movies, museums, etc.
- Take patients to clinics.
- Assist paid staff with physical care.
- Tutor in basic school subjects.
- Collect books and magazines; act as librarian.

**J. Maternity Homes.**

(Same general services as Institutions for Children.)

**X. Housing Programs.**

Make vacancy surveys and inspect vacancies in accordance with the standards established by the federal Division of Defense Housing Coordination and to local Homes Registration Office.

Lead recreation clubs and classes in housing projects.

**XI. American Red Cross Programs.**

There are opportunities for volunteer work in all the services of a *Red Cross Chapter* and particularly in the eight Corps groups under Volunteer Special Services, briefly described as follows:

1. *Staff Assistance Corps*—serves as an organizing and record-keeping staff whose help is available to all other services. Its members file, type, keep books, prepare reports, work on information and reception desks, translate, and organize classes for other services.
2. *Production Corps*—provides clothing for refugees, hospital comfort articles, and surgical dressings. Its members sew, knit, mend, and operate electric cutting machines and sewing machines.
3. *Braille Corps*—makes books for the blind. Its members transcribe, duplicate, and bind books in Braille, read to the blind, and teach them to read the Braille system.
4. *Canteen Corps*—undertakes emergency family and group feeding in times of local disaster, national emergency, or war. In normal times, they serve at Chapter houses and sponsor such projects as gardening, canning, and school lunches. (See American Red Cross pamphlet No. 722, Rev. Oct. 1941.)
5. *Motor Corps*—provides transportation in connection with regular Chapter activities—Services to the Armed Forces (including Home Service), Disaster Relief, and Junior Red Cross. Also, they may aid local or national philanthropic organizations. (See American Red Cross pamphlet No. 417, Rev. Oct. 1941.)



6. *Nurses' Aide Corps*—assists the professional nursing staff of hospitals, clinics, public health nursing organizations, schools, and industrial hygiene services. Its members work under the supervision of registered nurses. The requirements for membership in this Corps are stringent and the training course approved by the Office of Civilian Defense is mandatory.
7. *Home Service Corps*—assists the Chapter to discharge its obligation to active service and ex-service men and their families. Its members visit and interview families and individuals under supervision. Training in social case work practices is required of all applicants.
8. *Hospital and Recreation Corps*—is concerned with the maintenance of the morale of the active and ex-service men in hospitals. Under the direction of the medical officer, its members provide recreational work for the patients. They may also act as receptionists in clinics. The satisfactory completion of a prescribed course and of a probationary period is required of all who wish to join the Corps.

## **XII. War Relief Programs**

### **A. Production.**

Knit.

Sew.

Make surgical dressings.

Pack such material for shipping.

### **B. Office and Clerical Work.**

### **C. Publicity, Speaking, etc.**

### **D. Messenger Service.**

## **Training Courses in Civilian Defense**

The following are typical of training which is under way or contemplated:

Health—Hospital work, occupational therapy, home nursing, physical fitness, first aid.

Family and Child Welfare—Case-work aide service, child welfare service.

Recreation—Group leadership, mass recreation.

Consumer Programs—Leadership training, consumer education.

Nutrition—Nutrition leader, nutrition aide, nutrition apprentice.

General—Publicity, public speaking, community needs and facilities.

Some standardization of training for volunteers has been done. The following are instances:

Training	Agencies standardizing	Auspices of training
First aid.....	Office of Civilian Defense and American Red Cross.....	Red Cross.
Nurses' aide.....	Office of Civilian Defense and American Red Cross.....	Red Cross.

Training responsibilities for civilian protection in the Office of Civilian Defense are limited to the issuance of instructional data to be applied by the State and local defense organizations and to whatever guidance in setting up instructional schools may be necessary.

In many subdivisions of the civilian defense set-up, a large portion of the instruction can be applied only after enrollment, since the type of instruction is essentially practical in character, and not necessarily uniform in scope as between localities. For instance:

Air-raid wardens.

Fire watchers.



Rescue squads.  
Auxiliary police.  
Auxiliary firemen.  
Demolition and clearance squads.  
Road-repair squads.  
Staff corps.  
Decontamination squads.  
Bomb squads.

The thoroughness of the instruction required in large cities, to contend with the intricate problems involved in congested areas and skyscraper buildings, will not be essential in the thousands of smaller communities. The test of efficiency must be applied by local conditions.

Courses now worked out and of use in equipping workers for civilian protection duties are:

Nurses' aide.  
First aid.

Types of instruction now being developed and of use in civilian protection are:

Fire fighting.  
Gas defense.

## VOLUNTEER ENROLLMENT CARD

The Volunteer Enrollment Card which follows is suggested for both large-scale and small-scale operations.

In interviewing a volunteer, the registrar uses not only this Volunteer Enrollment Card but also a mimeographed list of Work Classifications. This should be prepared locally and contain all work opportunities available for volunteers. The list of Volunteer Work Opportunities contained in this Manual will be suggestive. The registrar discovers which of the types of work classified the volunteer is able to do and on the basis of this classifies the volunteer in the column of the Volunteer Enrollment Card headed, "Work Classification." She does this, however, only after completely interviewing the volunteer and filling out both sides of the Volunteer Enrollment Card.

An easy way to file the Volunteer Enrollment Card is to use a white card for the interview and for listing the volunteer's various work classifications. This card is then filed according to the first classification, i. e., the main skill of the volunteer. Blue cards should be used for listing any other work classifications of the volunteer, a separate card being used for each and these should be filed according to the secondary skills of the volunteer. The primary skill, Classification 1, should be listed as Classification 2 on the blue card or cards, so that quick reference can be made from the blue card to the white card. Blue cards need contain nothing else except the volunteer's name. The Volunteer Enrollment Cards should be filed in alphabetical order according to work classifications, e. g., typists would be filed under the letter "T" and nurses' aides under the letter "N."

A master file arranged alphabetically by surnames and giving the address, telephone number, and primary work classification of each volunteer should be maintained as a means of locating in the Volunteer Enrollment File the cards of any particular person when all that is known about him or her is the name.

### **Work Opportunity Card**

The Work Opportunity Card which follows is designed for recording information about the types of jobs which volunteers can do. One card should be filled out on each type of job. The cards should be filed in alphabetical order by the name of the agency.

LAST NAME (PLEASE PRINT)		FIRST	MIDDLE	WORK CLASSIFICATIONS		TRAINING DESIRED
HOME ADDRESS			PHONE			
CHANGE ADDRESS			PHONE	1		
BUSINESS ADDRESS			PHONE	2		
CHANGE ADDRESS			PHONE	3		
			PHONE	4		
IF MARRIED, NAME OF HUSBAND OR WIFE		NUMBER OF CHILDREN UNDER 6 YEARS	IN GRADE OR HIGH SCHOOL	FORMER MILITARY SERVICE BRANCH		TIME AVAILABLE S M T W T F S
AGE		PLACE OF BIRTH		IF FOREIGN COUNTRY STATE WHETHER NATURALIZED		
VISION	HEARING	TELEPHONE VOICE	PHYSICAL FITNESS FOR CHOSEN WORK	HEIGHT	WEIGHT	TIME NOT AVAILABLE
SKILLS, SPECIAL INTEREST, OR HOBBIES						
Languages (Specify)	English S R W	S R W	S R W	S R W	Passenger Car Available	Licensed Driver DATE

TECHNICAL OR BUSINESS.

## PROFESSIONAL

COLLEGE

## HIGH SCHOOL

GRAMMAR SCHOOL

EDUC

YEARS COMPLETED.

VOLUNTEER TRAINING COURSES COMPLETED

## WORK RECORD

DATE BEGAN

## REFERRAL RECORD

REMARKS

REMARKS

**SIGNATURE**



WORK OPPORTUNITY CARD				
AGENCY	WORK CLASSIFICATION		NUMBER WORKERS NEEDED	
ADDRESS	PHONE		SUPERVISOR	
PERSON TO CONTACT		PERSON TO WHOM WORKER REPORTS		
SEX	EDUCATION	EXPERIENCE		
AGE RANGE	PERSONAL QUALIFICATIONS	PHYSICAL QUALIFICATIONS		
MARITAL STATUS	DUTIES TO BE PERFORMED			
HOURS				
TEMPORARY				
PERMANENT				
OTHER (SPECIFY)				
EMPLOYMENT FACTORS			RECEIVED BY	DATE (OVER)

[illegible][illegible]

## LISTS OF FORMS

Volunteer Offices need a large number of forms, some printed, some mimeographed. What follows is merely the minimum.

1. Form for recording information about jobs. This should be a printed card, 5 by 8 inches. See page 22, Work Opportunity Card.
2. Form for recording information about training courses. This can be a letter size, mimeographed sheet, 8½ by 11 inches.
3. Form for recording information about organizations: Set-up, personnel, standards of work, adequacy of volunteer program. On this form can also be listed the types of jobs in which this organization uses volunteers and the types of training courses which it offers. This can be a mimeographed sheet, 8½ by 11 inches.
4. Form for recording information about the volunteer. This should be a printed card, 5 by 8 inches. See page 20, Volunteer Enrollment Card.
5. Form for recording names, addresses, telephone numbers, and primary work classification of volunteers. This is the master file which makes possible the location of Volunteer Enrollment Cards when only the name of the volunteer is known. This can be a mimeographed card 3 by 5 inches.
6. Form for introduction of volunteer and notice of result of agency interview. This should be mimeographed on a United States postal card. It can be presented by the volunteer to the organization, filled out by the organization to indicate acceptance or rejection of the volunteer, and mailed to the Volunteer Office.
7. Form for keeping daily and monthly record of referrals and placements. This should be a printed sheet, size 11 by 17 inches, on which the main headings refer to work and training classifications and the subheadings, to "referred," "accepted," "rejected."



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"No matter how long it may take us to overcome this premeditated invasion, the American people in their righteous wrath will win through to absolute victory. . . . With confidence in our armed forces—with the unbounding determination of our people—we will gain the inevitable victory—so help us God."

FRANKLIN D. ROOSEVELT,  
*President of the United States.*

DECEMBER 8, 1941.





# **VOLUNTEERS IN HEALTH, MEDICAL CARE AND NURSING**



**U. S. OFFICE OF CIVILIAN DEFENSE  
WASHINGTON, D. C.**

**F**OR USE of the Executives of Civilian Defense Volunteer Offices  
and Executives of Agencies Using Volunteer Services in Health,  
Medical Care, and Nursing Programs.

*Published by*

**U. S. OFFICE OF CIVILIAN DEFENSE**

*With the Cooperation of*

*the Office of Defense Health and Welfare Services*

*January 1942*



## FOREWORD

The health and welfare services now provided by national, State and local agencies must be strengthened and extended so as to meet the needs of all our people in time of war. One of the tasks of the Office of Civilian Defense is to bring the additional strength of citizens able and willing to offer their services in this field to both public and private agencies through the Volunteer Offices.

The Office of Civilian Defense is charged with the responsibility of keeping informed of community problems arising from the impact of military and industrial defense effort, and taking necessary steps to secure the cooperation of appropriate departments and agencies in dealing with such problems. To the Office of Defense Health and Welfare Services has been assigned the duty of serving as the coordinating center for wartime health and welfare services and the further duty of making available the assistance of specialists in health and welfare activities.

Because of the need of coordinating volunteer effort in health and welfare services with the work of existing agencies, the Office of Civilian Defense and the Office of Defense Health and Welfare Services have cooperated in the preparation of this Manual.

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# **VOLUNTEERS IN**

## **HEALTH, MEDICAL CARE, AND NURSING**

### **I. THE NEED**

The war emergency is making unprecedented demands upon the medical, nursing, medical social service and other personnel of hospitals, clinics, nursing and health services and social agencies.

These health workers are being called upon in ever-increasing numbers to meet the expanding needs of the Army and Navy.

They are being called too by industry—to guard the health and safety of the millions of workers now turning out tanks, planes, guns and equipment.

The shifting of large populations into new industrial areas and military encampments has created health hazards and problems which demand expert workers in public health and medical care.

Now that war has come, the number of available trained workers in medicine, public health and related activities is being still further depleted.

#### ***The Need For Volunteers in Health, Medical Care, and Nursing is Urgent:***

Volunteers with professional training can render invaluable service in their spare time.

Volunteers without special training will find much important work waiting to be done. They may take courses of study to fit them for specialized jobs.

Volunteer service in Health, Medical Care and Nursing is an important phase of the civilian defense of our country.

In wartimes volunteers who have learned to assist in the care of the sick and injured are of inestimable service to every community.

### **II. OPPORTUNITIES FOR VOLUNTEER SERVICE**

Volunteers are needed at once both for immediate work and for special training for future work.

Following are health, medical care and nursing services which require varying degrees of training:

- Admitting clerks in hospitals and institutions.
- Automobile drivers.
- Blood donors.
- Child-care assistants.
- Entertainment of children.
- Filing clerks.
- First-aid teachers.
- Health department assistants.
- Home-nursing teachers.
- Hospital and clinic assistants.
- Instructors in various handicrafts.
- Laboratory assistants.
- Library assistants.
- Medical social work assistants.
- Messengers.
- Nurses' aides.
- Nutritionist assistants.
- Occupational therapy assistants.
- Physiotherapy assistants.
- Readers—For patients.
- Receptionists.
- Sanitation workers.
- Secretaries.
- Typists.

Volunteers with professional training can be of enormous help.

#### ***For Example:***

Married nurses could teach home nursing classes.

Former chemistry teachers could help in laboratories.



Previously active qualified Medical Social Workers could return to hospitals for service.

A graduate nurse could assist in recruiting and interviewing candidates for nursing schools and also assist in interviewing those interested in taking home nursing and Nurses' Aide courses.

Trained publicity, advertising, and radio script writers could assist health departments and emergency medical services in the preparation health education material for local publications or on the air.

Employed nurses and other employed professionals can give service in free hours.

The agencies which need volunteers are listed below. Few communities outside of the large metropolitan areas have all of these agencies. However, practically every community has one or more eager to cooperate with the Civilian Defense Volunteer Office.

1. *Hospitals*—Both governmental and voluntary.
2. *Clinics*—Of hospitals, health departments and voluntary agencies.
3. *Convalescent Homes*—And institutions for the handicapped.
4. *Associations*—Cancer Societies, Social Hygiene organizations, Tuberculosis or Community Health Associations.
5. *Visiting Nurse*—Associations or services.
6. *Red Cross*—Services.
7. *Health Departments*—City or county.
8. *School*—Health services.
9. Other agencies conducting health programs.

Each health agency should examine carefully its own program of operation and determine where volunteer service can be useful to it. This information should be given to the Civilian Defense Volunteer Office.

The following pages take up the different types of Health, Medical Care and Nursing services which need volunteers, listing the necessary qualifications for work and training.

### III. QUALIFICATIONS AND DUTIES

#### *Orientation Course*

It is important for all volunteers to understand the program and policies of the organization to which they will be assigned.

The scope of this preparatory course and the number of lectures to be given should be determined by the individual hospital or health agency with the exception of the course already prescribed for Volunteer Nurses' Aides. An orientation course should include explanations of the following:

- (a) The place of the particular organization in the community health program.
- (b) How the agency is supported and administered.
- (c) Brief outline of other health agencies in the community and relationship to each other.
- (d) The organization of the hospital or agency, including functions of each department (presented by director, and supervisors of each department).
- (e) Tour of the hospital or agency buildings, to show general plan and location of each department (could be presented by experienced volunteer).
- (f) Rules of the institution or agency, and rules for volunteers concerning hours of work, necessary discipline, dress as prescribed by institution to which the volunteer is assigned, ethics both at work and outside of working hours, relationship to professional and non-professional staff, etc. (presented by staff member who will be in charge of volunteers).

Volunteers must be made to realize that they are being assigned a real responsibility and that regular attendance, promptness and a high standard of work is expected.

## ***Automobile Drivers***

Volunteers must receive training in motor mechanics and in first aid from the American Red Cross and other voluntary agencies before they become eligible for induction into the Ambulance Motor Corps.

Volunteers who take this training should preferably be able to provide a station wagon or suitable passenger vehicle which will be registered for service and, in emergencies, come under the control of a local Transport Officer.

Volunteers will be vitally needed for the transportation of persons who have sustained casualties, for the transport of doctors and nurses, the transport of supplies, for messenger service and the evacuation of patients.

Volunteer drivers can also perform a very useful service in bringing patients to and from out-patient clinics, especially children, older patients, and crippled or disabled patients.

## ***Blood Donors***

Almost any healthy adult can give a small quantity of blood without ill effect.

As plans for blood banks are established in the larger communities under auspices of a hospital, the Red Cross, or other agency, adult individuals from the general population may volunteer to give blood to help in accumulating an adequate supply for emergency needs.

Information about where to give this service may be obtained from the local health department, from the local Red Cross chapter or from the office of the local chief of Emergency Medical Services.

## ***Child Care Assistants***

Child care volunteers can assist materially in the expansion of existing health services for mothers and children and the organization of new activities to meet emergency situations. They should work under the direction of the physicians, nurses, medical social workers, nutritionists, or other technical staff.

Public health agencies need workers in programs of maternity care, child-health services, dental clinics, nutrition programs and health education.

Hospitals, sanitoriums and convalescent homes for children are eager to secure volunteers to supplement the services of the professional staff in the children's wards and out-patient departments.

Private health organizations such as visiting nurse associations and maternal and child-health

associations offer a variety of services to children to which a volunteer staff under professional direction may make a very real contribution.

### ***Eligibility:***

Over 18 years of age.

### ***Education:***

High school or equivalent.

### ***Training:***

The course for Volunteer Nurses' Aides (see page 7) prepares persons to assist in technical nursing duties related to illness and the prevention of disease. Whenever possible nurses' aides engaging in services for children should have, in addition, a background of information regarding the normal development and everyday care and management of children, their problems and special needs, and community services in behalf of children.

The basic principles of child care are outlined in a course described in a manual on "Volunteers in Child Care."

The course includes (a) 12 lectures and 15 hours of observation visits to various agencies for child care and (b) 50 hours of supervised practice in an agency offering the particular type of service in which the student volunteer wishes to continue. Completion of the course will permit the use of the title "Child Care Assistant." This supplementary training and experience should be made available to every volunteer nurses' aide who plans to participate in any service for children. It will prepare other volunteers to assist in clinics and wards in general supervision of children and to render certain types of general care but not technical nursing service.

### ***Assignments:***

1. Maternity and children's wards in hospitals.
2. Maternity and children's clinics and conferences.
3. Public Health Nursing agencies.
4. Convalescent homes.
5. Day nurseries and nursing schools.
6. Children's agencies and institutions.

For details concerning training and duties of Child Care Assistants, and the recommendations for the agency or group of agencies which should assume responsibility for the teaching and supervision of the course, see manual on "Volunteers in Child Care."



## ***First Aid Teachers***

As many persons as possible should receive training in first aid, so that they may be prepared not only for service in the event of disaster but in everyday emergencies. Many instructors in First Aid are needed.

### ***Training Necessary:***

Volunteers should first take the standard Red Cross course in first aid for Civilian Defense (20 hours) followed by the Advanced Course in first aid (10 hours) both of which were prepared by the Red Cross in collaboration with the Medical Division of the Office of Civilian Defense.

Volunteers should then take the Instructors Course (15 hours), so that they may qualify as Red Cross Instructors and be ready to spread first aid training as widely as possible among the civilian population.

### ***Professional Volunteers:***

Physicians and nurses are urged to volunteer their time as first aid teachers. Physicians will be certified as instructors for first aid courses on application to local Red Cross chapters. Graduate nurses and dentists may if they wish take the advanced first aid course without taking the basic course. They must also take the instructors course to qualify as teachers. Some physicians prefer to take the instructor's course before they start to teach.

Student nurses and nonprofessional hospital personnel should take the standard course as well as the advanced course.

### ***Industrial Volunteers:***

Factory workers and employees of large business establishments and Government bureaus should sign up for first aid instruction so that they may be organized into First Aid Detachments. It is the aim of the O. C. D. to have one out of every five workers take a course in first aid.

### ***Home First Aid:***

It is desirable that one person in each home have knowledge of first aid.

## ***Home Nursing Teachers***

Home nursing courses are provided by the American Red Cross and by other agencies for as large a number of women in each community as possible.

Volunteer teachers are needed. Experience has shown that a graduate nurse is the most satisfactory teacher for a home nursing course. She may have help for some lessons from other professional workers.

The purposes of these courses are:

1. To spread knowledge—
  - (a) of health protection.
  - (b) of simple procedures essential in home nursing.
2. To help women—
  - (a) to keep their families well.
  - (b) to take care of illness in their own families.

Needs for volunteer home nurses are greater in a national emergency when we are faced with an increasing shortage of trained nurses.

Eligibility—No age limit.

Education—No limitation.

## ***Health Department Assistants***

Volunteers who have not had training as Nurses' Aides (see page 7) may be assigned to work as volunteer assistants in various bureaus and clinics of the health department.

The health department will assume the responsibility of training for the special duties in the clinic or bureau in which volunteers are to serve. In most divisions of the health department the shortage in trained personnel has made it desirable to enlist the help of volunteer assistants.

### ***Eligibility:***

Age, over 18; good health.

### ***Education:***

Local option; probably high-school graduate or equivalent.



### **Orientation:**

Short introductory course given by health department.

### **Training:**

Special apprentice training by the health department to prepare the volunteers for work in a specific division of the health department.

### **Assignments:**

- (a) Receptionist.
- (b) Messenger.
- (c) Assistant secretary and typist.
- (d) Assistant file clerk.
- (e) Assistant record clerk.
- (f) Clinic assistant.
- (g) Statistical assistant.
- (h) Information center clerks for health department buildings.

## **Hospital and Clinic**

### **Assistants**

Hospitals and clinics are in need of many volunteer assistants. Unlike Volunteer Nurses' Aides, they do not act as assistants to a nurse in her special nursing functions, but they are equally important for the work of the hospital. They may do many of the tasks which nurses have been doing but which do not require professional education.

In hospitals the volunteer assistants help in the care of wards and operating rooms, assist in reception services, record rooms, social service departments, kitchens, laundries, surgical dressing rooms, and supply rooms. In clinics they serve as receptionists, messengers, typists, file clerks, and admitting clerks. They may be assigned as laboratory assistants. *They are intended to supplement and not to replace the paid personnel.* Training will be provided by the hospitals or clinics to which the volunteer assistants are assigned.

### **Eligibility:**

Age, 18 and over; good health.

### **Education:**

Local option.

### **Orientation:**

Given by the agency to which volunteer is assigned.

### **Training:**

Training for specific activities to be given at the hospital or clinic to which the volunteer is assigned for duty.

### **Assignments:**

- (a) Receptionist.
- (b) Messenger.
- (c) Ward assistant.—For such duties as directing visitors, keeping bedside tables in order, delivering mail and books to patients, making telephone calls for patients, etc.
- (d) Clinic assistant.—For such duties as directing patients to proper rooms; taking care of or playing games with children while mother is being examined; putting clinic rooms in order; cleaning equipment trays; helping patients to dress, etc.
- (e) Record-room assistant.
- (f) Assistant secretary or typist.
- (g) Assistant file clerk.
- (h) Assistant admitting clerk.

### **Duties:**

To be specifically explained by agency to which volunteer is assigned and to be supervised routinely by person responsible for each department.

## **Laboratory Assistants**

Volunteer assistants in the laboratory services of a hospital or health department are not intended to do the work of the technician. They may assist with the cleaning of glassware and the care of equipment and may participate in preparations for tests such as assembling equipment, marking empty tubes or slides.

It is important to remember, however, that all testing, recording of results of tests and reporting should be done by the professional trained staff who are equipped to assume such serious responsibility.

### **Eligibility:**

Age, 18 or over.

### ***Education:***

Local option; may require chemistry or physics students or those who have had some science courses.

### ***Orientation, Training:***

Short course in hospital organization and procedures followed by training for specific activities in the department of the hospital or agency to which the volunteer is assigned for duty. (See above.)

### ***Assignments:***

- (a) General laboratory helper to care for equipment.
- (b) Assistant file clerk.
- (c) Technician's assistant to prepare equipment for specific procedure to work under close supervision, never alone.

If the volunteer has technical training, such as that of a graduate chemistry student, he may be given some further responsibility; such as preparation of solutions and making urine analysis. Like every volunteer worker, he is under close supervision, but with advanced educational qualifications he may be given some practical experience which will be of benefit to him as well as to the laboratory.

### ***Library Assistants***

Hospital library assistants can give valuable service in both patients' and medical libraries. In the patients' library, by furnishing selected reading matter to patients, the assistant provides diversion and relaxation of real therapeutic value. The volunteer assistant can assist in cataloging and in distribution and collection of books.

In the medical library volunteers can assist in cataloging and in keeping a check on journals and texts. They may also help with library exchange service and in looking up references in the scientific literature.

### ***Eligibility:***

Age over 18.

### ***Education:***

Local option, usually high-school graduates. A retired librarian may be sought to give expert help.

### ***Training:***

Apprentice training for specific activities in library to which volunteer is assigned. Work is under supervision of the librarian.

### ***Assignments:***

- (a) Filing.
- (b) Typing reference cards.
- (c) Sorting incoming references.
- (d) Distributing and collecting books and magazines from patients.

## ***Medical Social Service Assistants***

### ***Eligibility:***

The medical social-service assistant should have intelligence, good educational background, tact, discretion, and a healthy point of view toward persons who are ill or convalescing. There are no fixed educational requirements. The minimum age is 18 years.

### ***What the Medical Social Service Assistant May Do:***

The purpose of medical social work is to help patients meet social difficulties which are caused or accentuated by their illness and which present obstacles to their deriving full benefit from medical treatment and care. The service rendered in fulfilling this purpose necessitates technical skill and knowledge.

Training, assignment, and supervision of volunteers in a medical social department are the responsibilities of the director. The assistant may perform the following typical duties:

- Receptionist.
- Interpreter.
- Operator of clothing storeroom.
- Clerk.
- Motor Corps assistant.

The exact services to be undertaken by volunteers spring from the needs within a given medical social-service department or unit and therefore will be determined locally in each hospital or health agency.

Additional information on the use of volunteer services in medical social-work departments or units may be secured from the American Association of Medical Social Workers, 844 Rush Street, Chicago, Ill.



## **Nurses' Aides**

The term "Nurses' Aide" is restricted to those persons who have completed the 80-hour course of the American Red Cross and the Office of Civilian Defense.

The training course is given by the Red Cross in collaboration with hospitals which have been designated as training centers by the Office of Civilian Defense and the Red Cross.

Those who complete the 7 weeks' course become members of the Red Cross Volunteer Nurses' Aide Corps. They are required to give at least 150 hours of service annually during a 3-month period to retain membership in the Corps. The first 150 hours of service are to be in hospital wards.

The Volunteer Nurses' Aides do part-time service as assistants to graduate nurses in hospitals, clinics, health departments, visiting-nurse services, school health departments, and the like.

During the war, members of the Volunteer Nurses' Aide Corps will be assigned to assist with the care of civilian casualties in hospitals and with Emergency Medical Field Units in First Aid Posts and Casualty Stations.

### **Eligibility:**

American citizen; age 18 to 50; good health.

### **Education:**

High-school course or equivalent.

### **Training:**

Eighty-hour course, the first half in Red Cross chapter house or other suitable place, the second half supervised practice in a hospital designated as a training center by the Office of Civilian Defense and American Red Cross. Thereafter, 150 hours of service in wards of a hospital during a 3-month period must precede assignment to work as assistant to nurses in a clinic or field nursing service.

Health departments and public-health nursing agencies will give supplementary training before assigning the Volunteer Nurses' Aides to duty. This additional training will consist of an explanation of the agency's program, a short observation of the work carried on, and teaching of the specific

duties which the volunteer will be asked to perform. For example, in a baby-health station the routine for examining the babies and the plan for immunizations will need to be explained. In school-health services, a period of observation and apprentice training will be necessary for an understanding of the school-health program and of the routine carried out for the examination of school children.

### **Assignments:**

- (a) Hospital wards.
- (b) Hospital clinics.
- (c) Hospital out-patient departments.
- (d) Health department clinics.
- (e) Baby-health stations.
- (f) Prenatal clinics.
- (g) School-health services.
- (h) Visiting-nurse service.

### **Duties:**

The authorized duties prescribed by the Red Cross course (ARC-774) *are always subject to the approval of the individual institution or agency.* For example:

- (a) *In Hospital Wards.*—Make beds, including ether beds and empty cradle beds; assemble material for baths and give baths to patients not seriously ill; record in a note book patients' intake and output of liquids; take temperature, pulse, and respiration; prepare patients for meals and feed helpless patients; etc. For a complete outline of the work, see "Chapter Organization and Administration of Red Cross Volunteer Nurses' Aides Corps" (ARC-775) published by the American National Red Cross and approved by the Office of Civilian Defense.
- (b) *In Hospital Clinics.*—Help with the admission of patients; keep clinic equipment in order; set up examination, testing, and treatment trays and clean up after use; chaperon and drape patients for doctor's examination; change linen on examining tables; accompany patients to and from X-ray departments, etc.



(c) *In Health Departments, Baby Health Stations, Prenatal Clinics and School Health Services.*—Same as above for clinics and other duties as assigned by organization. Nurses' Aide may also make visits to the patients' homes to urge delinquent patients to return to clinic, or to secure routine information needed for clinic records, but not to perform nursing services, secure professional information, or give health teaching.

(d) *Visiting Nurse Services.*—Nurses' Aides may assist nurses in giving care to sick patients in their homes. The aide can give assistance that will enable the nurse to finish the needed services much faster and allow for visits to a greater number of patients. Aides may visit homes alone to render nonprofessional services, but not for teaching or for independent nursing responsibilities.

(e) *As Members of Emergency Medical Field Units.*—In the event of bombing or other emergencies, medical field units will be sent from hospitals to the scene of an "incident" by the Chief of Emergency Medical Services. Each medical team will have one or more Nurses' Aides who will assist the doctors and nurses with the care of the injured in First Aid Posts and casualty stations.

### ***General Principles in Use of Volunteer Nurses' Aide Service***

Because of their training, Volunteer Nurses' Aides can be used to best advantage in assisting with direct nursing services. They are always to work under the supervision of a graduate nurse when giving service directly concerned with the patient. The special training given to the Nurse's Aide should not be wasted by assigning her *wholly* to duties such as those of receptionist or messenger, which less highly trained volunteers can perform.

Some health organizations and hospitals may prefer to have all volunteers take the Nurses' Aide course. It may not be practical, however, for everyone who assists in these agencies to do so. Hospitals may not have facilities for giving large

numbers the prescribed training and supervision in a short time. Where a selection of duties for volunteers is possible, therefore, Nurses' Aides should be assigned those tasks for which the course has particularly prepared them.

The Volunteer Nurses' Aide uniform, which is issued by the Red Cross, may be worn only by those who have successfully completed the prescribed Volunteer Nurses' Aide Course and who give a minimum of 150 hours' service annually thereafter as prescribed by the local Volunteer Nurses' Aide committee. (For volunteers other than Nurses' Aides, the dress worn should be prescribed by the agency in which the volunteer works.)

### ***Nutritionist Assistants***

Volunteers may be assigned to health or welfare departments to assist the trained nutritionist in teaching menu planning, the proper preparation of foods, and budgeting, and in setting up exhibits, showing nutrition films, and giving food demonstrations.

Courses in nutrition may be given by health departments, Red Cross chapters and by other organizations, in cooperation with or under the direction of the local nutrition committees.

These committees are sponsored by and may receive help and guidance from State or county nutrition committees. State committees are in turn advised by the Nutrition Division of the Office of Defense Health and Welfare Services of the Federal Security Agency. In the Red Cross program the term "Nutrition Aide" is used to designate those who have completed the Red Cross standard nutrition course of 20 hours.

For full details concerning eligibility, education, training, and classification of volunteer positions in the nutrition field see *Manual for Volunteers in Nutrition*.

### ***Occupational Therapy Assistants***

Hospitals and clinics will find the services of volunteer assistants valuable in their departments of occupational therapy. They are to assist the trained technician but are not to assume any independent responsibilities for therapeutic procedures.

### ***Eligibility:***

Age over 18; good health; emotional stability; volunteer must agree not to do occupational therapy work except under the direction of a trained therapist.

### ***Education:***

High-school graduate or equivalent.

### ***Orientation and Training:***

Forty-hour course to be taken in 8-10 weeks; lectures, 8 hours; craft instruction, 32 hours. On completion of this preliminary training the volunteer will be expected to give at least 3 periods per week of 3 hours each for 2 weeks, and later a minimum total of 150 hours of service in 1 year will be expected. This course is to be given under the direction of teachers from occupational therapy training schools accredited by the American Medical Association, or by members of the staff of the hospital occupational therapy department. Further apprentice training for specific activities will be given at the hospital to which the volunteer is assigned for duty. (For an outline of the suggested training course, consult the American Occupational Therapy Association, 175 Fifth Avenue, New York City.)

### ***Assignments:***

- (a) Assist patients from wards to occupational therapy departments.
- (b) Assist with record keeping.
- (c) Help patients to obtain work materials.
- (d) Assist with craft instruction for recreation, such as knitting, chip carving, and leather work; always under supervision of the professional worker.
- (e) Help to put rooms in order after work periods.

The uniform suggested by the American Occupational Association is a neutral linen tailored coat, with a red arm band with initials O. T. V. A. (Occupational Therapy Volunteer Assistant). The decision about this rests with the hospital to which the volunteer is assigned.

## ***Physiotherapy Assistants***

Many of the larger hospitals are now using volunteer assistants in their departments of physiotherapy. They assist the professional workers but are not to assume any independent responsibilities for therapeutic procedures.

### ***Eligibility:***

Age over 18; good health.

### ***Education:***

High-school graduate or equivalent; otherwise local option may require physical education students or graduates.

### ***Orientation:***

Short course at hospital to which volunteer is assigned.

### ***Training:***

Apprentice training for specific activities in physiotherapy department of hospital to which volunteer is assigned.

### ***Assignments:***

- (a) Assist patients from wards to physiotherapy departments.
- (b) Assist with record keeping.
- (c) Help patients to undress and dress.
- (d) Put treatment rooms in order.
- (e) Stay near patients during heat or light treatment.
- (f) Assist with baths or other simple treatments under supervision of person in charge of the departments.

For further information about the use of volunteers in physiotherapy write to the Office of the American Physiotherapy Association, at 737 North Michigan Ave., Chicago, Ill.

## ***Sanitation Work***

In the event of interruption of water supply by bombs, the need for emergency toilet facilities cannot be overlooked. Temporary privies would be dug in "back yards," and there would be a need to have this work done promptly and properly. Under the instruction and supervision of the Sanitary Officer or Inspector of the Health Department, volunteers would be needed to accomplish the necessary digging.



## IV. INSTRUCTIONS TO VOLUNTEERS

The Volunteer Office should tell candidates that work in the health field is serious work and demands definite qualifications. Since he is dealing with matters of life and death, the volunteer must be ever punctual and thoroughly dependable.

The volunteer in health work must have an interest in the welfare of people, good health, tact and sympathy, dignity, a respect for authority, personal integrity, and ability to keep confidences.

The last mentioned is especially important. In all health agencies it is a strict requirement that information about patients is confidential. Volunteers must always respect and observe this rule.

It should be explained that the most valuable volunteer in the health field is the one who does exactly what he is told when a duty is assigned. This code of conduct is part of medical ethics and is followed by all doctors and nurses.

A volunteer's ideas for change are often valuable. However, these should be discussed only with the person in charge and only *after* the assigned task has been carried out.

The Volunteer Office can also assist by directing candidates with the proper qualifications into serious study and preparation that will give them professional status in health, medical care, and nursing. For instance, there is a demand for

student nurses, and young women who qualify should ~~be able to~~ enter an accredited school of nursing. For entrance requirements for accredited schools of nursing write to Nursing Information Bureau, 1790 Broadway, New York City.

## V. WHERE VOLUNTEERS SHOULD APPLY

Volunteers should apply at the local Civilian Defense Volunteer Office. In communities in which such an office has not yet been established, persons who wish to participate as Civilian Defense Volunteers in the health and medical field should apply to the local Defense Council, to the department of hospitals, to the health department, the Visiting Nurse Association, or to the local Red Cross chapter. If you do not know where to apply, write to your State Defense Council.

## VI. LOCAL ORGANIZATION

The recruiting, training, and placement of volunteers in the various health, medical care, and nursing services should be cleared through the local Civilian Defense Volunteer Office. If such an office has not been established in your community, you should help to get it organized. Meanwhile, individual organizations should continue to develop their own volunteer program.



## VII. SUGGESTED READING LIST

- Mustard, Harry S. An introduction to public health. New York, The Macmillan Company, 1935. 250 pp.
- Sedgwick, William T. Sedgwick's principles of sanitary science and public health, rewritten and enlarged by Samuel C. Prescott and Murray P. Horwood. New York, The Macmillan Company, 1935. 654 pp.
- Hiscock, Ira V. Community health organization. 3d ed. New York, Commonwealth Fund, 1939. 318 pp.
- Smillie, Wilson G. Public health administration in the United States. 2d ed. New York, The Macmillan Company, 1940. 553 pp.
- Bassett, Clara. Mental hygiene in the community. New York, The Macmillan Company, 1936. 394 pp.
- Parran, Thomas. Shadow on the land: Syphilis. New York, Reynal and Hitchcock, 1937. 309 pp.
- Klinefelter, Lee M. Medical occupations. New York, E. P. Dutton and Company, 1938.
- Vocational advice to men about fields related to medicine.
- Davis, Michael M. Clinics, hospitals, and health centers. New York, Harper Brothers.
- Public Affairs Committee. Better nursing for America. 1941.  
Available from the Nursing Information Bureau, 1790 Broadway, New York City.
- Picture Facts Associates. Nurses at work. New York, Harper Brothers, 1939.
- The book is made up largely of pictures, with just enough text to tell their stories. Facts were supplied by the Nursing Information Bureau of the American Nurses Association; pictures by hospitals and nursing organizations. Price \$1.
- Davis, Evelyn K. The volunteer in public-health nursing. National Organization for Public Health Nursing, 1790 Broadway, New York, N. Y. 1941.
- National Organization for Public Health Nursing. Outline for a survey of community nursing service. 1790 Broadway, New York, N. Y., 1940.
- The American National Red Cross. Syllabus of course of instruction for volunteer nurses' aides, as revised with the collaboration of the Medical Division of the U. S. Office of Civilian Defense. Washington, 1941.
- Thornton, Jannet. The social component in medical care. New York, Columbia University Press, 1937.
- Bartlett, Harriet. Some aspects of social case work in a medical setting. Chicago, American Association of Medical Social Workers, 1940.
- Stern, Edith M. Betty Blake, O. T. New York, Dodd, Mead, and Company.
- Concerns the field of occupational therapy.
- Jones, Edith K. The hospital library. Chicago, American Library Association.

Professional magazines are now publishing timely articles about volunteer service. Ask your local professional personnel to give you information about these magazines.



# TRAINING COURSES FOR CIVILIAN PROTECTION

*Enrolled Volunteer Groups*



*Issued by*

U. S. OFFICE OF CIVILIAN DEFENSE

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# **I. ORGANIZATION OF SCHOOLS**

## **PURPOSE**

This publication is issued to help those responsible for Civilian Protection in their communities plan, organize, and conduct training courses for volunteers in the Civilian Protection services.

The respective sections deal with the basic courses, common to more than one group, and the special-duties subjects pertaining to individual groups of workers.

This publication is intended as a guide only and not as a restrictive or limiting set of rules. There will be need for adaptation to the particular circumstances of each community. Local authorities should not hesitate to amplify or adapt these suggestions to their own local communities, so long as the basic standards and minimums for Federal recognition are not altered.

## **FEDERAL RECOGNITION**

Federal recognition of enrolled workers is evidenced by award of arm bands carrying appropriate insignia. These designs are covered by design patents which have been assigned to the United States in order to limit their wear to those who can perform the duties that go with them—just as Army or Navy uniforms are restricted to the persons who can perform the duties they imply.

Satisfactory completion of the courses prescribed for any group, or the approved equivalent (see below), is the basis for Federal recognition. Workers who have definitely enrolled, and are in training, but who have not yet qualified for the appropriate insigne, may wear the basic “CD” insigne.

## **THE PROTECTIVE TEAM**

The reason for these rules is that the protective workers constitute a team who, by their joint action, can limit the damage caused by falling bombs or other hostile attack. Members of the team must be able to recognize each other instantly—*and to know what each can be expected to do.*

Training courses develop and teach these skills. Completion of the courses means possession of the minimum skills required to enable the team to operate.

## **CIVILIAN PROTECTION**

By Civilian Protection is meant those phases of the Civilian Defense program that relate to the preservation of life and property. These activities are divided among several emergency services, each of which calls for the work of two or more special groups of workers.

## **THE U. S. CITIZENS' DEFENSE CORPS**

Together, these groups and services constitute the U. S. Citizens' Defense Corps of a community.

In each community, a commander, assisted by a command group, is in general charge of the organization. The principal divisions and special groups under each are as follows:

**STAFF GROUP:**

Command Section.  
Service Section.  
Drivers, Messengers, Telephonists,  
and Office Personnel.

**EMERGENCY FIRE SERVICE:**

Auxiliary Firemen.  
Rescue Squads.

**EMERGENCY POLICE SERVICE:**

Auxiliary Police.  
Bomb Squads.

**AIR-RAID-WARDEN SERVICE:**

Air Raid Wardens.  
Fire Watchers.  
Emergency Food and Housing.

**EMERGENCY MEDICAL SERVICE:**

Medical Field Units.  
Nurses' Aides.  
Medical Auxiliaries (Stretcher  
Teams).

**EMERGENCY PUBLIC WORKS SERVICE:**

Demolition and Clearance Crews.  
Road Repair Crews.  
Decontamination Squads.

**EMERGENCY UTILITIES SERVICE:**

Utilities Repair Squads.

## LOCAL RESPONSIBILITY FOR TRAINING

The responsibility for training the large numbers of volunteers who will be needed for these services in the various communities is a responsibility of the communities themselves.

It is recommended that each community organize, as a part of its civilian protection program, Civilian Defense Schools in which this training can be given. Such schools should be organized by, and under the control of, the local Civilian Defense authorities—the local Coordinator and Council of Defense, upon the recommendation of the Commander, Citizens' Defense Corps.

While the responsibility for training rests on local authorities, these agencies should secure the cooperation of local groups who have experience in organizing and conducting training courses.

In most communities there are people capable of undertaking this work, or assisting in it. Such persons may be found in departments of industrial plants, in vocational schools, technical high schools, colleges, universities, and other educational institutions; or in fire, police, or other municipal departments.

Those who have had experience in planning and conducting training for adults will be very helpful in setting up local training programs for civilian protection workers.

## CIVILIAN DEFENSE SCHOOLS

These schools should be organized to suit the needs and facilities of each community, with regard to available places, times, and extent. The local Council of Defense should appoint a Director of Civilian Defense Schools, together with such assistants as are needed. Classes should be planned with regard to needs of students for transportation, with regard to their available time (day, night, Sunday, etc.), and with regard to available classrooms—school buildings, libraries, unoccupied stores, lodge halls, municipal buildings, etc., all being drawn upon as they are available.



## SUBJECTS TO BE TAUGHT

The subjects should be those which will enable the volunteer workers to qualify for Federal recognition. The requirements for the various groups are given on pages 5 and 6.

It will be noted that these requirements are of two kinds—basic subjects and special-duty subjects. The basic subjects are included in seven courses, which are required for each of two or more groups. The special-duty subjects pertain to the duties of the individual group.

The courses in the basic subjects can be organized immediately, dependent only upon finding suitable places, assigning suitable times, and securing suitable instructors.

The special duty subjects can follow, normally, after instruction in the required basic subjects. In most cases, it may be expected that it will take longer to organize the special-duty courses than it will take to organize the basic courses.

## INSTRUCTORS

There is a nucleus of trained instructors in most States; this nucleus can be first employed to give courses for others who will be later qualified as instructors. In this way, a body of specialized instructors can be created in each community, in a very short time. This step has already been taken, prior to the outbreak of war on December 7, 1941, in many States.

The American Red Cross has undertaken to give the instruction in First Aid in all Communities. It already has a roster of qualified instructors in this subject. The American Red Cross Chapter in the local community should be consulted as to the number of instructors available, if this has not already been done. Inasmuch as most groups require one form or another of First-Aid training, an immediate start can be made by initiating the First-Aid classes without delay.

Where the number of Red Cross instructors is inadequate, physicians in the community will be certified by the American Red Cross as qualified instructors.

The American Red Cross has also the responsibility for the special training of Nurses' Aides, in collaboration with hospitals designated as Training Centers, and arrangements for this training should be discussed with the local American Red Cross Chapter.

Instructors for the courses in Fire Defense should come primarily either from or through the local Fire Department. All Fire Departments have access to information on the training of auxiliary firemen, through their own organizations of Fire Chiefs, etc. Opportunities have been provided to each region for inclusion of Fire Officers in the Civilian Defense Courses which have been conducted by the Chemical Warfare Service of the United States Army at Edgewood Arsenal, Edgewood, Md., since July 1, 1941. Between that date and the outbreak of war on December 7, 1941, eleven classes were trained at Edgewood. Graduates of these and later classes are qualified to train instructors who in turn can give the Fire Defense courses in local schools.

Local authorities charged with organization of Civilian Defense Schools should accordingly enlist the assistance of their local Fire Departments, in securing instructors in Fire Defense.

Similarly, many police officers have attended the Civilian Defense Schools at Edgewood Arsenal, and are qualified to assist in the instruction in Gas Defense which is prescribed. Both Fire and Police officers who have graduated from Edgewood are qualified to train instructors who in turn can give the required instruction in Gas Defense.

Instructors for the General Course can be secured from the body of qualified individuals in the community. Their own instruction should be initially given by the Commander of the local Citizens' Defense Corps, or by those designated by him. Inasmuch as it will reflect the



local organization and its relation with such wider installations as the Air Craft Warning Service, it had best be supervised initially by those who are adapting the general suggestions of the U. S. Office of Civilian Defense with the local needs and conditions.

Local schools and colleges having units of the R. O. T. C., or similar organizations, can be drawn upon for instructors in drill, to include simple facings and marchings. Instruction in drill should be given early in the course, so that the students are able to move in an orderly manner, and not as a disorganized mob, at the earliest possible date.

Instructors for the special subjects will be discussed in relation to those subjects as they are detailed below.

## II. REQUIREMENTS FOR FEDERAL RECOGNITION

The following table summarizes the requirements by subjects and hours for Federal Recognition and award of insignia for the various enrolled volunteer-worker groups. For description of courses, see below:

<p><b>1. Command Section:</b></p> <p>Basic subjects..... 22</p> <p>First Aid..... 10</p> <p>Fire-Defense A..... 3</p> <p>Gas-Defense A..... 2</p> <p>General Course..... 5</p> <p>Drill..... 2</p> <p><b>2. Messengers:</b></p> <p>Basic subjects..... 22</p> <p>First Aid..... 10</p> <p>Fire-Defense A..... 3</p> <p>Gas-Defense A..... 2</p> <p>General Course..... 5</p> <p>Drill..... 2</p> <p><b>3. Drivers:</b></p> <p>Basic subjects..... 40</p> <p>First Aid..... 10</p> <p>Gas-Defense A and B..... 5</p> <p>General Course..... 5</p> <p>Drill..... 2</p> <p>Night Driving—Convoy Driving..... 5</p> <p>Black-out Driving..... 3</p> <p>Map Reading..... 2</p> <p>Minor Roadside Repairs..... 5</p> <p>Test and Optional..... 3</p> <p><b>4. Auxiliary Firemen:</b></p> <p>Basic subjects..... 32</p> <p>First Aid..... 10</p> <p>Fire-Defense A and B..... 10</p> <p>Gas-Defense A..... 2</p> <p>General Course..... 5</p> <p>Drill..... 5</p> <p><b>5. Rescue Squads:</b></p> <p>Basic subjects..... 42</p> <p>First Aid..... 20</p> <p>Fire-Defense A and B..... 10</p> <p>Gas-Defense A and B..... 5</p> <p>General Course..... 5</p> <p>Drill..... 2</p>	<p><b>6. Auxiliary Police:</b></p> <p>Basic subjects..... 28</p> <p>First Aid..... 10</p> <p>Fire-Defense A..... 3</p> <p>Gas-Defense A and B..... 5</p> <p>General Course..... 5</p> <p>Drill..... 5</p> <p><b>7. Bomb Squads:</b></p> <p>Basic subjects..... 19</p> <p>First Aid..... 10</p> <p>Gas-Defense B..... 2</p> <p>General Course..... 5</p> <p>Drill..... 2</p> <p><b>8. Air-Raid Wardens:</b></p> <p>Basic subjects..... 25</p> <p>First Aid..... 10</p> <p>Fire-Defense A..... 3</p> <p>Gas-Defense A and B..... 5</p> <p>General Course..... 5</p> <p>Drill..... 2</p> <p><b>9. Fire Watchers:</b></p> <p>Basic subjects..... 12</p> <p>Fire-Defense A..... 3</p> <p>Gas-Defense A..... 2</p> <p>General course..... 5</p> <p>Drill..... 2</p> <p><b>10. Emergency Food and Housing:</b></p> <p>Basic subjects..... 7</p> <p>Gas-Defense A..... 2</p> <p>General Course..... 5</p> <p><b>11. Medical Auxiliaries (not including doctors and registered nurses):</b></p> <p>Basic subjects..... 29</p> <p>First Aid..... 20</p> <p>Gas-Defense A..... 2</p> <p>General Course..... 5</p> <p>Drill..... 2</p> <p>(Plus such special training as is directed by Emergency Medical Division, Office of Civilian Defense.)</p>
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(5)

	<i>Hours</i>
12. Nurses' Aides: Total (basic subjects only) ..	19
(Technical training, 80 hours, is a prerequisite of Federal recognition for Nurses' Aides.)	
Basic subjects .....	19
First Aid .....	10
Gas-Defense A .....	2
General Course .....	5
Drill .....	2
(Plus Nurses' Aide Course given in connection with approved hospitals; consult local chapter of American Red Cross.)	
13. Demolition and Clearance Crews:	
Basic subjects .....	12
Fire-Defense A .....	3
Gas-Defense A .....	2
General Course .....	5
Drill .....	2

	<i>Hours</i>
14. Road-Repair Crews:	
Basic subjects .....	12
Fire-Defense A .....	3
Gas-Defense A .....	2
General Course .....	5
Drill .....	2
15. Decontamination Squads:	
Basic subjects .....	22
First Aid .....	10
Gas-Defense A and B .....	5
General Course .....	5
Drill .....	2
16. Utilities-Repair Squads:	
Basic subjects .....	8
Gas-Defense A .....	3
General Course .....	5



### III. OUTLINE OF COURSES—BASIC SUBJECTS

The following brief outline of basic courses is recommended for use in Civilian Defense Schools:

1. First Aid (Practical Course): 10 hours. As prescribed by the American Red Cross—consult your local chapter.

*Text:* Red Cross Text Book (supplemented by OCD Handbook of First Aid).

*NOTE.*—If the only available practical course offered by your local Red Cross Chapter is a 20-hour course, this must be substituted for the 10-hour course. Where the 10-hour practical course is interpolated in the basic training schedule, an additional 10 hours of First Aid will be required after completion of the course, in order to qualify for the First Aid Certificate.

2. Fire Defense A: 3 hours. Handling Incendiary Bombs.

*Text:* Fire Defense, published by U. S. Office of Civilian Defense.

*Lecture Material:* Edgewood Lectures, published by U. S. Office of Civilian Defense.

3. Fire Defense B: 7 hours. Methods of Fire Defense.

*Text:* Fire Defense, published by U. S. Office of Civilian Defense.

*Lecture Material:* Edgewood Lectures, published by U. S. Office of Civilian Defense.

4. Gas Defense A: 2 hours: Use and Care of Gas Masks.

*Text:* Protection Against Gas, published by U. S. Office of Civilian Defense.

*Lecture Material:* Edgewood Lectures, published by U. S. Office of Civilian Defense.

5. Gas Defense B: 3 hours. Methods of Gas Defense.

*Text:* Protection Against Gas, published by U. S. Office of Civilian Defense.

*Lecture Material:* Edgewood Lectures, published by U. S. Office of Civilian Defense.

6. General Course: 5 hours. Nature and Organization of Civilian Protection.

*Text:*

*Lecture Material:* Civilian Defense Ordinances and regulations of your own community.

Constitution of the United States and of your own State.

Publications of the U. S. Office of Civilian Defense:

How the Aircraft Warning System Works. (Chart.)

Instructional Letter No. 5 with Supplement No. 1.

A Civilian Defense Volunteer Office.

Blackouts.

Air Raid Warning System.

Emergency Medical Service for Civilian Defense.

Civilian Protection—How to Organize It in Your Own Community.

Citizens' Defense Corps.

Civil Air Patrol.

The Control Center.

A Handbook for Air Raid Wardens.

A Manual for Staff.

**7. Drill: 2 hours, 3 hours, or 5 hours.**

*Text:* Citizens' Defense Corps Drill Manual.

*Lecture Material:* None.

NOTE.—All publications of the U. S. Office of Civilian Defense that are listed above will be available through State Councils of Defense after January 1, 1942.

## **SUBSTITUTION OF COURSES**

Regional Directors of the U. S. Office of Civilian Defense are empowered to accept courses, wherever given, which they find after review are the equivalent of the above courses both as to hours of instruction and as to subject matter. Regional Directors may, in their discretion, delegate this power to State coordinators or executive directors. Regional or State authorities should not employ this power in a casual or loose manner; and they should keep records showing the courses approved for acceptance in lieu of required courses, showing the name of the course, place and time it was given, and the organization sponsoring it.

## **DIRECTION OF THE TRAINING**

It will be well for some one person to be selected to direct the entire training program which is prepared for the civilian protection workers. Such a person should have had experience in the training of adults, and should be given the responsibility for organizing all phases of the training work. It is not expected that he will be fully familiar with the content of the various courses, and it is not necessary that he teach any of them. He should, however, know how to secure competent instructors, arrange for places of meeting, secure any needed instructional material, plan the schedule of meetings, and see that the necessary reports are secured.

One essential part of his work will be to assist the teachers in planning their work and in using effective methods. A person who has had experience in directing a program of adult education in vocational or other subjects will understand how to proceed in this work, and his assistance should be secured either as director or advisor. The responsibility for this training program rests with the local defense authorities, but this responsibility can probably best be discharged by securing an experienced person to direct it.

## **INSTRUCTORS**

One person should be considered as the instructor for each course, and should be held responsible for reporting on work done and on attendance. He may have as many assistants as the needs of the situation may require.

If it is not possible to secure one person who can give instruction in all the elements of any one course, it may be advisable to bring in one or more additional people to discuss certain topics.

## **SIZE OF CLASSES**

Since the purpose of the basic courses is to furnish information and to secure an appreciation of the various phases of civilian defense, the classes may be rather large. If they can be kept to a maximum of 35 to 40, the results will be more satisfactory than if larger numbers are enrolled. With a group of this size, there will be better opportunities for questions and discussion from the class.



## PLACE OF MEETING

The primary consideration in selection of places at which to hold the basic courses is the convenience of the persons who are to attend. For later, specialized courses other factors must also be considered, however.

For the basic courses instruction may be given in any suitable places that are readily accessible to the members of the groups in training. Public schools will probably be most satisfactory, but halls, community centers, or other public meeting places, will be suitable if there is ample seating capacity. Blackboards should be provided for use in making diagrams and charts, but large sheets of manila paper tacked to the walls may be used instead. Every effort should be made to provide tables or chairs with table arms to make it easier for members of the classes to take notes.

## METHODS OF INSTRUCTION

Since the purpose of the courses is to give information, the chief method used will be oral explanation. This does not mean that set lectures should be prepared and read to the classes. The instructor should give his explanations in an informal way, using pictures, charts, and diagrams to supplement his talks.

After covering any single phase of his subject, he should give ample opportunity for questions and should encourage discussion. From time to time, also, he should ask questions to find out how well the members of the group understand the work covered.

If a brief summary of the work covered in each lesson can be mimeographed and given to each member of the group, it will be very helpful. A digest should be made of the chief points covered in the discussion, and any charts, diagrams, or tables so used should be reproduced. This material should not be handed out until the end of the class session in order to avoid distracting the attention of the members.

At the end of each course, an appropriate written or oral test should be given. A record should be kept of members of the class who complete the work satisfactorily so that they will be eligible to take the later special duty courses provided they meet any other requirements for particular types of work.

## TIME OF MEETING

For most persons, probably evening sessions will be most satisfactory. There will be some volunteers, however, who work on night shifts or for other reasons have more free time in the day. Some arrangement should be made for classes for these people during daylight hours.



## IV. DISCUSSION OF BASIC COURSES

Following are more or less detailed discussions of the basic courses outlined in Section III.

All of these courses will need in some degree to be adapted to the individual community. For example, in the General Course, the form and details of organization adopted for the particular community will be the basis of the course so far as the local organization is concerned. No general rule can be laid down for all communities. Likewise, in the two Fire Defense Courses, the form of organization in each Fire Department, and the type of construction and similar elements entering into the local fire hazard, will cause variations in the basic courses suggested.

This discussion material has been prepared by the U. S. Office of Civilian Defense with the assistance of experts in the respective fields. The discussion of the General Course was prepared with the cooperation of the U. S. Office of Education; that of the Gas Defense Courses, with the assistance of the Chemical Warfare School, Edgewood Arsenal, Edgewood, Maryland; that of the Fire Defense Courses, with the aid of the Fire Defense Advisory Committee of the Office of Civilian Defense.

### A. THE GENERAL COURSE

The general course is intended to give information to all volunteer civilian protection workers regarding certain essential features of the protection program under which they are enrolled. The outline which follows is suggestive only. Since local plans for civilian defense will vary in different communities, it will be necessary to modify the outline for the general course so that students will secure an understanding of the local situation. The suggested course, with a tentative time schedule, follows.

1. *The Local Defense Organization* (1 to 1½ hours).—The local plan under which the civilian protection activities are carried on should be explained. Any local ordinances or other formal provisions for civilian defense should be mentioned. Information should be given about the local Defense Council; the Civilian Defense Volunteer Office; and the Citizens' Defense Corps. The relationships between these various groups should be discussed so that the members of the training course will have a clear understanding of the way in which the civilian protection program is operated.

The relationship of the local organization to larger civilian defense units should be explained briefly. These are: the State Council of Defense, the Regional Office of Civilian Defense, and the U. S. Office of Civilian Defense, Washington, D. C.

A chart will be helpful to show the local protection organization and its relationship to larger units of Civilian Defense work. This may be patterned after the chart "Suggested Local Civilian Defense Organization" issued by the United States Office of Civilian Defense on October 20, 1941 (or later edition), but modifications should be made to show the exact local arrangements. The State Council of Defense, or groups in other localities within the State, may have issued similar charts which will be helpful.

The following publications of the U. S. Office of Civilian Defense give information bearing on the subject of this meeting:

*Civilian Protection: Why, What, How, Who, Where, When* (Oct. 1941).

*How to Organize Civilian Protection in Your Community.*

***A Civilian Defense Volunteer Office (Dec. 1941).***

Material giving legal basis for Civilian Defense organization—such as local ordinance, State law, Executive Order; for U. S. organization, the Executive Order of the President on May 20, 1941, and Administrative Orders of the U. S. Director Civilian Defense establishing Regional Offices.

*Lecture Material.*—*Edgewood Lectures*, Series 1, General Subjects, Published by OCD.

2. *The Control Center* (1½ to 2 hours).—Under immediate direction of the Commander of the Citizens' Defense Corps is the Control Center, which coordinates local civilian protection activities. The various services directed by the Control Center should be explained—their purposes, the duties of each, and their relationships to each other.

Special emphasis should be placed on the possible need for restriction of the use of communication facilities during emergencies. The different means of communication between the control center and the various groups, and between groups and the center, should be explained, with particular attention to the plan of reporting.

The charts shown in discussion of the preceding subject, or supplementary detailed charts, may be used to show details of the local Control Center. Pictures of the insignia used by the different groups enrolled in the Citizens' Defense Corps should be displayed so that students will learn to identify each.

The following publications of the U. S. Office of Civilian Defense will be found of assistance:

*The U. S. Citizens' Defense Corps.*

*Protection of Industrial Plants and Public Buildings* (August 1941).

*How to Organize Civilian Protection in Your Community.*

*Emergency Medical Service for Civilian Defense* (July 1941), Part I and Part II.

*Control Staff Manual, Citizens Defense Corps Systems Operation.*

3. *The Air Raid Warning System* (1 to 1½ hours).—The respective roles of the Military Air Craft Warning Service and the Civilian Air Raid Warning System should be distinguished. Particular attention should then be given to the purpose, organization, and operation of the Civilian Air Raid Warning System. The means of transmitting warning messages, the types of signals used, the preparation and maintenance of warning lists, and public warning systems should be explained.

Charts showing the different types of signals used, which agencies receive the different signals, and the kind of civilian action taken in response to each signal or warning, will be helpful.

The following publications of the Office of Civilian Defense are to be used for reference:

*Air Raid Warning System* (Sept. 1941).

*Control Systems* (Dec. 1941).

*Chart: Army Flash.*

4. *Blackouts* (1½ to 2 hours).—The purpose of this part of the course will be to acquaint the enrolled workers with the reasons for and methods of producing blackouts. The need for planning, advance preparation, and full cooperation should be emphasized. Information should be given about blackout regulations and responsibility for enforcing them; plans for marking streets and aiding the movement of traffic; and the extent and nature of lighting restrictions. There should be some discussion of the general means used in obscuring lights, but no attempt should be made to train the members of the group to perform these duties. Training in such duties will be given in a specialized course which will follow.

To help members of the group secure an appreciation of blackout conditions, the room may be made entirely dark and the individuals given an opportunity to try to find their way to various points. Local problems to be encountered in a blackout should be discussed so that members of the group will realize the many difficulties to be considered in providing for an effective black-



out. The following publication of the Office of Civilian Defense will be used as a general reference: *Blackouts* (1941) Especially. Foreword and Chapter I.

The work outlined in this section should be covered in a maximum of 5 hours. It is believed that 3 or 4 meetings of the class will be advisable. Experience has shown that people who are not accustomed to sitting still and listening give satisfactory attention for about an hour but not much more. In planning the time for each topic, provision should be made for discussion. If a session longer than an hour is to be held, a brief rest period should be provided at the end of 45 minutes or an hour, with discussion during or following the first as well as the second part of the session. Only under unusual conditions should an attempt be made to hold a group for more than 2 hours.

## B. FIRE-DEFENSE COURSES

Two fire-defense courses are suggested: Fire-Defense A, a 3-hour course, having to do with the handling of magnesium and other small incendiary bombs; and Fire-Defense B, a 7-hour introduction to general fire-fighting methods.

Neither of these courses overlaps with the Training Course for Auxiliary Firemen, Section I, which will occupy 20 hours, and which is special duty, rather than basic, training. This 20-hour course is discussed in detail in Section V, Special Duty Training, part D, to which reference is made.

Auxiliary Firemen who enrolled in and complete the Training Course for Auxiliary Firemen, Section I, are presumed to have completed Fire-Defense A and Fire-Defense B, the subject matter of these courses being included in the technical training.

Following is a lesson outline which may be adapted to the needs of an individual community:

### FIRE-DEFENSE A (3 HOURS)—CONTROL OF INCENDIARIES

1. *Kinds and purposes of incendiary bombs.*—Magnesium-thermit type; white phosphorus type; oil bombs; weights and kinds in current use; enemy methods of distribution; enemy purposes in incendiary bombing; probable and possible future use by Germans, Japanese, or Italians.

2. *Magnesium-thermit bombs;* water-spray method of control; use of garden hose; use of "Arrow" Pump and "Indian" Pump; use of stirrup pump if available; home fire-fighting teams; use of soda-acid extinguishers; why carbon tetrachloride extinguishers should not be used.

3. *Sand method of fighting magnesium-thermit incendiaries;* to concentrate on dangerous ones; cleaning up to be sure fire is out; methods of making attics, etc., resistant to incendiaries. Demonstration, or practice, in extinguishing incendiaries of material is available.

*Texts: Fire Defense.*

*Handbook for Auxiliary Firemen.*

Published by the Office of Civilian Defense.

*Lecture Material: Edgewood Lectures.* Series 2, *Fire Defense.* Published by the Office of Civilian Defense.

*Training Film: Fighting the Fire Bomb.* 14 minutes, black and white film with sound track, distributed by Office of Civilian Defense through State Defense Coordinator.

### FIRE DEFENSE B (7 HOURS)—INTRODUCTION TO GENERAL FIRE FIGHTING METHODS

1. *Fire Department Organization—Alarms.*—The organization of the regular and auxiliary fire services in your city; rules, regulations, and duties; the alarm system of the regular Fire Department; the emergency system; how alarms are responded to by regular and auxiliary units.



2. *Apparatus, Tools, and Equipment*.—What the fireman works with; fire truck, hand tools, ladders, hose, hose appliances, hand extinguishers, lighting equipment, first-aid equipment, etc.

3. *Hose Practices*.—Description of the purpose, use, and requirements; individual and group demonstration of such things as hose loads, hose-load finishes, hose carries, hose lay-outs, breaking and coupling hose, and taking up hose.

4. *Ladder Practices*.—Ladder requirements, equipment, and use; demonstration of carrying, raising, lowering both wall ladders and extension ladders. Use of 14-foot straight ladder and 24-foot extension ladder to receive special attention.

5. *Rope Work*.—Such knots and ties as are commonly used; selection, care, and use of hand line; making knots and hitches; coiling rope; hoisting tools and equipment.

6. *Elimination of Fire Hazards*.—Fire prevention in peacetime and wartime; making home attics fire resistant; cleaning up basements and closets; provisions for reserve water supply; home prevention work.

7. *Emergency Fire-Fighting Practices*.—Special problems of war situations; regular and reserve water supplies; how drafting from ponds, rivers, etc., is done; rescue squads and debris fires; review of course; demonstrations.

*Text: Fire Defense*. Published by the Office of Civilian Defense.

*A Handbook For Auxiliary Firemen*. Published by the Office of Civilian Defense.

*Lecture Material: Edgewood Lectures*. Series 2. *Fire Defense*. Published by the Office of Civilian Defense.

## INSTRUCTORS

Instructors should be sought through your local Fire Department. The services of graduates of the Civilian Defense Schools should be employed wherever available. Graduates should be employed, if possible, to instruct groups who can in turn become instructors, thus widening their usefulness in the time which may be available in any particular community.

Great attention should be paid to the question of magnesium incendiaries in the organization of Fire Defense A. The water-spray method of handling them should be taught; also the use of the soda-acid extinguisher; and the employment of sand should be taught though only as an expedient if nothing else is available. Instruction in use of stirrup pumps and other hand-spray appliances should only be taught where such devices are generally available; it is better to teach the simpler methods, using what is available, than to delay instruction at all until specialized equipment becomes available.

It should be noted that most of the instruction in handling incendiaries is based upon the German type of incendiary bombs which were used against England. As this is sent to press (December 1941) it is not known whether such incendiaries are to be expected in the case of bombardment by Japanese. While they are not known to have manufactured them, they may have a supply from German sources.

Should the situation clarify in this regard, it is contemplated that either emergency instructions will be issued through the press and radio, or that supplementary training memoranda will be issued through the usual channels by the Office of Civilian Defense. In the former case, the instructions will be clearly marked, "Official—Office of Civilian Defense." In the latter, the source will be indicated on the title page. It is suggested that the precaution be taken to await these instructions, and not to accept casual information which may be in error.

## C. GAS-DEFENSE COURSES

As this is sent to press (December 1941) war gas has not yet been used against civilian populations except in one instance in Asia. However, the *threat* of gas attack has been used since the first days of the war in September 1939 and earlier. The threat of attack has been

used to place hampering restrictions upon the movements of civil populations, and to increase public uneasiness. That the *threat* of the use of gas has not had more public effect in England and in America, is a tribute to the fine morale of the people themselves; but it must not be forgotten that our enemies are desperate and that, failing to secure the desired effect by threat of gas, they may decide to try for their effect by the actual use of it.

Accordingly, Gas Defense courses are included in the requirements for most of the Federal recognitions of Citizens' Defense Corps members. Two courses are suggested, Gas-Defense A and Gas Defense B. The first is limited to use and care of the gas mask; the second includes the use of protective clothing, the means whereby it is possible to continue necessary field operations under gas conditions, gas alarms, and gas identification.

The two courses together aggregate 5 hours. Gas Defense A is a 2-hour course; Gas Defense B is a 3-hour course.

Following is a lesson outline for the courses in Gas Defense:

### **GAS-DEFENSE A (2 HOURS)—USE AND CARE OF THE GAS MASK**

1. *The Civilian Gas Mask*.—Nature, nomenclature, and functioning of the gas mask; how to fit it, how to put it on, how to clear it, how to test for gas, how to remove the mask. As soon as masks are available this lesson should include practice in putting on and removing masks.

2. *Care and Storage of the Gas Mask*.—Review of Lesson 1; How to carry the mask; how to put it in the carrier; inspection of masks; storage of masks; improvised masks of wet earth, grain, etc., rolled in handkerchiefs; Types of gasses; identification.

### **GAS DEFENSE B (3 HOURS)—METHODS OF GAS DEFENSE**

1. *Types of War Gases*.—Detailed study of chart of types, action, etc.; Review of gas mask, procedure; Protective clothing—purpose, use, storage, procedure for putting it on and taking it off; identification of principal gases.

2. *Gas Protection Methods*.—Procedures for gasproofing rooms, houses, etc.; gasproof doors; Decontamination agents and their use; improvised antigas measures.

3. *First Aid for Chemical Casualties*.—What to do at once if liquid vesicants touch the skin; use of copper sulfate for white phosphorus burns; treatment of lung-irritant cases; other approved methods.

The text for both courses, "*Protection Against Gas*," is published by the Office of Civilian Defense, and was specially prepared by the Chemical Warfare Service of the United States Army for this particular emergency. It is available through the usual channels, by local Defense Councils.

In addition to the text, lecture material is provided, also published by the U. S. Office of Civilian Defense. This material constitutes a selection from the stenotyped reports of the lectures at the Civilian Defense Courses at the Chemical Warfare School, Edgewood Arsenal, Edgewood, Md. The reports of the lectures have been edited only to remove confidential material or that which does not have general application. It is not suggested that these lectures should be given as "canned lectures." Rather, they are supplied as background material on which the instructor should draw in planning his own course and adapting it to the particular needs of his own community.

### **INSTRUCTORS**

The officers, both of Police and of Fire Departments, and others, who have attended the Civilian Defense School, are the best qualified as instructors; however, they can best serve, not



as instructors of the classes, but as instructors in chief who can train instructors who will in turn teach the classes.

If officers of the Chemical Warfare Reserve, United States Army, not on active duty, are available in the community, their services should be sought to serve as instructors.

The single qualification of a knowledge of chemistry or experience in teaching chemistry, does not alone qualify one to act as an instructor in defense against chemical agents used in war. Tactics, method, material, meteorology, and physiology are more pertinent to defense than chemistry.

It is contemplated that more detailed memoranda on Defense against Gas may be issued, in case of need, on short notice, should the war situation require it. If this is the case, such memoranda will be issued by the Office of Civilian Defense through the usual channels. Failing the necessity and consequent issuance of such memoranda, instructors should be careful not to accept casual information which is at variance from that in the official text and lecture material. Such acceptance might involve a heavy toll of life at some future date. Ordinary common-sense caution in this regard is called for.

## **D. FIRST AID COURSES**

The basis of training in First Aid is the standard, 20-hour, practical course of the American Red Cross, which leads to a First Aid Certificate from that organization.

However, for the purposes of the emergency, the American Red Cross in collaboration with the Medical Division, O. C. D., has devised a briefer presentation of that course, for Civilian Defense Units, with the elimination of some lessons, which can be given in 10 hours. This is the 10-hour course referred to in Section III, Outline of Courses.

It should be clearly understood that where the American Red Cross does not offer the 10-hour, practical course, but offers only the full 20-hour course, the latter must be substituted for the former in order to secure the award of Federal recognition and armband insignia.

It is hoped that all those who acquire the requisite skill for emergency use, imparted by the 10-hour course, will go on to complete their training by taking the other 10 hours of instruction, and so qualify for the Red Cross First Aid Certificate. There is great need in both emergency and in ordinary civil life for numbers of people who are fully qualified to render adequate first aid, and, accordingly, for completion of the full 20 hours necessary for the Red Cross First Aid Certificate.

After completion of their first-aid training, members of organized Civilian Defense Units will receive the O. C. D. Handbook for First Aid with which to continue this practice in First Aid procedures.

Instructors in First Aid, and class arrangements, should be secured through your local American Red Cross Chapter. Through the headquarters of the American Red Cross, Washington, D. C., all local chapters are kept abreast of developments and the needs of the emergency program.

### **10-HOUR FIRST-AID COURSE FOR CIVILIAN DEFENSE**

#### **1. First hour:**

General instructions.

Organization and functions of Emergency Medical Field Units.

First-aid kit.

#### **Second hour:**

Care of wounds.

Practice in the application of dressings and bandages.



2. First hour:
  - Control of bleeding—elevation, pressure on wound, pressure points, tourniquet.
  - Care of burns.
 Second hour:
  - Bandage practice—compress bandage, large dressings, triangle bandage, sling.
3. First hour:
  - Fractures—what not to do, emergency care, immobilization, spine fractures—neck, back.
  - Splints and traction procedures.
 Second hour:
  - Practice in the application of splints and traction procedures.
4. First hour:
  - Artificial respiration.
  - Prevention and care of shock.
 Second hour:
  - Transportation—demonstration and practice: lifts and carries, loading and carrying stretcher.
5. First hour:
  - War gases—decontamination.
  - Unconsciousness.
 Second hour:
  - Transportation practice—loading and carrying stretcher, loading ambulance or truck.

#### 20-HOUR FIRST AID COURSE FOR CIVILIAN DEFENSE

1. First hour:
  - General instructions.
  - Dressings and bandages.
 Last hour:
  - Bandage practice.
2. First hour:
  - Circulation of the blood.
  - Care of wounds.
  - Control of bleeding.
  - Shock.
 Last hour:
  - Practical problems and practice in the care of wounds and the control of bleeding.
3. First hour:
  - Care of wounds.
  - Internal injury.
  - Transportation of the injured.
 Last hour:
  - Practical problems and practice in the care of wounds and the control of bleeding.
4. First 90 minutes:
  - Artificial respiration.
  - Causes of asphyxiation.
 Last 30 minutes:
  - Practical problems and practice in giving artificial respiration.

5. First hour:  
Fractures and splints.  
Last hour:  
Practical problems and practice in the application of splints.
  6. First hour:  
Burns.  
Sunstroke and heat exhaustion.  
Heat cramps.  
Frost bite and freezing.  
Last hour:  
Practice in the application of splints and traction procedures and transportation of fracture cases.
  7. First hour:  
War gases.  
Last hour:  
Practice and practical problems in the prevention and treatment of shock and the care of burns.
  8. First hour:  
Unconsciousness.  
Last hour:  
Practice and practical problems in transportation.
  9. Common emergencies:  
Examination on artificial respiration.
  10. First 90 minutes:  
General Review.  
Last 30 minutes:  
Practice and practical problems.
- EXAMINATION.

## E. DRILL

The purpose of drill courses suggested in the outline of basic courses is twofold: First, to enable groups of workers to move in a rapid and orderly manner, as an *organization* instead of a *mob*; and second, to secure something of coordination and precision—discipline—within groups.

The hours provided in the various requirements—2, 3, or 5—are those which it is estimated will be necessary to learn the elements of simple facings, marchings, and unit movements respectively. It is expected that after these are learned, some time in each unit practice period will be devoted to practice of the drill and to the securing of snap, precision, and perfection in its performance.

Such time will be well repaid in any emergency—not only in the ability to move the unit rapidly to the scene of action, but in improved coordination and teamwork, and in the more rapid and accurate response to the commands and instructions issued in action.

The local college or high school R. O. T. C. unit, the local chapter of the Reserve Officers' Association, and similar organizations, may be called on for instructors. Since the Drill Manual of the Citizens' Defense Corps is based upon the Infantry Drill Regulations, U. S. Army, instructors familiar with army close-order drill will find themselves on familiar ground in undertaking this instruction.

The effect on morale of inspections and reviews of drilled organizations should not be overlooked. For such purposes the drill instruction will prove invaluable. The individual's pride in himself, his unit, his country, and his cause, is immeasurably heightened by such exercises.

## V. SPECIAL DUTY COURSES FOR "FIRST CLASS" RATING

The training in basic courses outlined in Sections III and IV qualifies the individuals completing it for award of Federal recognition. However, a rating of "First Class" is provided in many of the enrolled worker groups, for those workers who have completed, in addition to the basic courses prescribed for their respective groups, the special duty courses indicated or to be indicated.

This section discusses the special duty training provided for the various groups, insofar as it is now possible to specify it. It is to be remembered that much of this material is based upon the experience of Britain, prior to the outbreak of the Japanese war on December 7, 1941. It is not yet known, nor can it be, what difference in technique of waging barbaric war may be introduced by the Japs, and what difference in instruction of Civilian Protection workers may be made necessary thereby.

As with the detailed discussions of basic courses, cooperation of many technical groups must be acknowledged. This is especially true of the discussions of Fire, Police, and Emergency Medical Services.

Suggestions for the conduct of courses under Section III were prepared with the cooperation of the U. S. Office of Education, and will be found applicable in general to the preparation and conduct of special duty courses as well.

"First Class" rating is evidenced by one black pyramid added below the insigne of the worker. It is to be awarded at the graduation exercises of the class by which the worker acquires it. (See Section VIII.)

### A. STAFF TRAINING

The Staff is, as its name implies, composed of those who man the control center and those who exercise command on behalf of and in the name of the Commander of the U. S. Citizens' Defense Corps.

This group (Command Section) will be personally trained by the Commander himself, in line with his personal desires for the exercise of command. This training will be done, in part, informally by conferences. However, it must be in addition to the basic training specified.

The Command Section will require special technical training, in addition to the specified basic training. The following subjects are suggested:

1. *Map Reading.*

(With special reference to the city map of the community.)

2. *Municipal Organization.*

(City Charter, city officers, city business management; relations between and authority of departments; functions of all branches of city government.)

3. *Utilities.*

(Organization, location, and operating methods of municipal or private services.)



**4. City Geography.**

(Detailed study of the city from the viewpoint of location of all facilities and community elements.)

**5. Law of Authority.**

(Study of National and State Constitutions, and sections of city charter, which establish or affect civilian defense, with special reference to the basis of authority for the Civilian Protection forces.)

**6. Staff Operation and Functions.**

(Theoretical and practical study of set-up and minute-to-minute operations of a working staff; to include tests with simulated reports of incidents.)

**7. Messages and Reports.**

(Methods of preparing, dispatching, receiving and recording reports and messages and of checking to insure appropriate action has been taken.)

**8. Inspections and Reviews.**

(Methods of conducting inspections and reviews, and reporting on the same.)

## INSTRUCTORS

City officials should prepare and give the instruction on Municipal Organization, Utilities, City Geography, and Law of Authority. Instructors in Map Reading, Messages and Reports, and Inspections and Reviews, should be sought among the R. O. T. C. instructors of local schools and colleges, or the local chapter of the Reserve Officers' Association. The Commander himself should conduct the instruction in Staff Operation and Functions.

A basic text is the *Staff Manual, U. S. C. D. C.*, published by the Office of Civilian Defense, and available through State Defense Councils after January 1, 1941. Also, *Control Systems*, published by O. C. D.

## B. MESSENGER TRAINING

Training by which messengers qualify for the "First Class" rating, is not arduous or complicated.

It should include the following courses or subjects:

**1. City Geography.**

(Study, on map and ground, of the streets and physical lay-out of the city, so that the messenger will be able to find his way quickly and accurately to all points.)

**2. Black-out Training.**

(Training in methods of finding designated points under black-out conditions.)

**3. Message Procedure.**

(Training in receiving and accurately delivering both written and verbal messages.)

## INSTRUCTORS

The City Engineer or corresponding official, or the local U. S. Postmaster, or the managers of local offices of telephone or telegraph companies, should be asked to designate suitable persons to give instructions in City Geography.

The Office of the Chief Warden should be asked to provide instruction in Blackout Operation Message Procedure.

The basic text is the "*Handbook for Messengers*," published by the Office of Civilian Defense, and available through State Defense Councils after January 1, 1942.

## C. DRIVERS' TRAINING

The specialized training for Drivers' Corps members is included in the requirements for Federal recognition. (See Sec. II and Sec. III.) This is because of the safety requirements for performance of any driver's mission.

Further training should consist of actual driving, under whatever conditions may be encountered. This may well be established by local authorities on the basis of a minimum number of volunteered driving hours in each 2-week period.

Volunteered hours may be put to practical use, if the drivers will put themselves at this disposal of the Commander of the U. S. Citizens' Defense Corps. In this way, drivers can obtain practical experience on driving missions and at the same time render real service much needed by every local Commander.

In the discretion of local authorities a test may be arranged for award of the "First Class" rating. This test should involve satisfactory completion of a driving mission which will include all the kinds of driving, and all the driving conditions, likely to be encountered under "combat" conditions.

The test should be fair and not unduly difficult. It should be judged by an impartial board of three or more. The standards should be definite, uniform, and clearly announced in advance.

The basic text is the *Handbook for Emergency Drivers* published by the Office of Civilian Defense, and available through State Defense Councils.

## D. AUXILIARY FIREMEN'S TRAINING

The special duty training of auxiliary firemen is a responsibility of the Chief of The Fire Department.

A suggested outline for this training, which has the approval of The Fire Defense Advisory Committee of The Office of Civilian Defense, is separately published under the title, "Training Auxiliary Firemen." It is published by the U. S. Office of Civilian Defense, and is available after January 1, 1942, through State Councils of Defense.

This training outline suggests the organization of three phases of instruction as follows:

Initial training—20 hours.

Advanced training—30 hours.

Supplemental training—as desired.

### INITIAL TRAINING

The purpose of this training is to prepare auxiliary firemen for immediate use in case of an air raid; their work at this level to be limited to ground work and to include such operations as laying hose lines and handling hose; carrying, raising, and placing ladders; and supplying regular firemen with tools and equipment. The subject matter of Fire Defense B (see basic courses, Section III, p. 12) is included in this course.

### ADVANCED TRAINING

This training is intended further to prepare auxiliaries for the more hazardous occupations of fire fighting, such as climbing ladders, entering buildings, and advancing hose lines.



## SUPPLEMENTAL TRAINING

This training is intended to fit selected auxiliaries to relieve regular firemen, in such duties as driving and placing equipment, operating pumping units, producing fire streams, drafting water, rescue work, etc.

Text: *Fire Protection*, published by O. C. D.

*Handbook for Auxiliary Firemen*, published by O. C. D.

## E. RESCUE SQUADS' TRAINING

In view of the particular importance of rescue work and of the varied functions which rescue personnel may be called upon to perform, training must be thought of in terms of a long-range and continuous program. It should be carried on as part of the regular daily routine at the Rescue Squad Depot notwithstanding the many other claims that may be made on the Service.

Training in special rescue duties, the elements of building construction, the use of rescue equipment, first aid, gas defense, and incendiary bomb control, should form the basis of regular practice in order that individual proficiency may be turned into effective teamwork.

Training for "First Class" rating should consist of special duties of Rescue Squads, team training, and combined training.

Although First Aid is not the primary responsibility of Rescue Squads, proficiency in First Aid technique is important, especially in loading and carrying stretchers.

## INDIVIDUAL TRAINING

If properly recruited, various members of the Rescue Squad will already be familiar with specific aspects of the work to be undertaken. It is important, however, that *all* members become familiar with at least the fundamental principles involved. The following curriculum is suggested:

1. *The Rescue Service.*

General organization; Details of local organization; Organization of the Rescue Squad Depot; details of shifts, etc.

2. *Rescue Procedure.*

Action on receipt of air-raid warning message; Action on arrival at the scene of an incident.

3. *Knots and lashings.*

Description of various types of ropes, how laid, strength, care, etc.; description of various knots, bends, and hitches and their special uses; practice with various kinds of knots and pole lashings.

4. *Sheerlegs, derricks, etc.*

Rigging, erecting, and manipulating various types; precautions to take; strength of poles, stresses, and strains involved.

5. *Shoring.*

Description of various types of shores and their purpose; principles of design and method of setting out; temporary and improvised shores; use of folding wedges; precautions to be taken.

6. *Lifting Gear—Jacks and Rope Tackle.*

Description of jacks and various types of tackle; principles of levers, gears, etc.; how power is gained with tackle.



### 7. *Demolition.*

Demolition by manual labor and explosives; precautions to take in the clearing of debris; risks of further collapse and steps to take to prevent same; ways of finding entombed persons.

### 8. *Oxyacetylene Cutting.*

Explanation of how cutter works; details of apparatus and how to connect up and light; how to cut, protection of trapped persons from sparks, etc.

## TEAM TRAINING

It is necessary to train members of the Rescue Squad, who have already received or are receiving individual training, to work together as a team under their own Leader. In the confusion which may be encountered at the scene of an air-raid incident, it is of great importance that Rescue Squads should be able to tackle their work in a systematic manner as organized and disciplined units.

### Suggested Curriculum for Team Training

#### (1-Hour Practice Drills)

1. *Loading Drill.*—Stowage and checking of equipment in vehicles; unloading vehicles; laying out equipment for inspection.
2. *Protective-Clothing Drill.*—Dressing and undressing, cleansing procedure.
3. *Action Upon Receipt of Air-Raid Warning Message.*
4. *The Use of Ropes.*—Uncoiling, coiling, and stretching; control and handling; hauling; reeving tackle; practice in the ropework necessary for the assembly of derricks, trestles, and tripods.
5. *The Use of Ladders.*—Unloading, carrying, placing in position, halving, and putting together; extending, ascent, lashing, and manning the ladder; descent and lowering; methods of strengthening for special purposes.
6. *The Application of Shores.*—Practice in hoisting prepared shores into position, strutting, wedging, and securing; taking down again and stowing for re-use; practice in setting shoring problems to full size.
7. *The Use of Standing Derrick, Swinging Jib, and Sheer Legs for Rescue Work.*
8. *Ladder Rescue.*—Fireman's lift; sliding stretcher.
9. *Rope Rescue.*—Various methods using ropes only to lower a stretcher from a height.
10. *The Use of Staging and Bridges for Rescue Work.*
11. *Handling Light Debris and Extricating Casualties.*—Systematic procedure, protection of casualties; team work in the lifting of wreckage, chain work in clearing debris, and the use of the services of unskilled bystanders.
12. *Tunnelling.*—Precautions against collapse; use of boarding, struts and spreaders, debris baskets and chain work, tapping for casualties.
13. *Demolition.*—Practice in cutting through walls, floors, girders, roofs, etc., to obtain access to trapped persons and to eliminate risk of loss of life through structural collapse; the collapse of dangerous chimneys, overhanging ruins, unseated floors, and other dangerous structures; improvised fans, hoardings, scaffolding, staging, etc.

## COMBINED TRAINING

Rescue Squads should have combined training with other groups from the Civilian protection services in order that each may be cognizant of the respective functions, procedure, technique, and facilities of the other. Only then will proper coordination of all services be possible.

Combined training should be given with the following services:

- Air Raid Wardens.
- Emergency Medical Units.
- Demolition and Clearance Crews.
- Decontamination Squads.
- Fire Services.
- Utilities Repair Squads.

## F. AUXILIARY POLICE TRAINING

The technical training of Auxiliary Police is a responsibility of the Chief of Police.

Schools have been conducted, under the auspices of the Federal Bureau of Investigation, in police duties of auxiliary police, in 260 cities, to which all police executives have been invited. It is believed that graduates of these schools are available as instructors for every community in which Auxiliary Police organization is planned.

The training of auxiliary police should be broken up into the following phases, in addition to the basic subjects discussed in Section III:

- Initial Training—20 hours.
- Advanced Training—30 hours.
- Supplemental Training—as desired.

### INITIAL TRAINING

This training is intended to qualify the auxiliary policeman for immediate use in case of air raids. It should include instruction and practice in such subjects as: local police department organization; law of arrest; prevention of casual offenses; traffic control and duty; prevention of panic; and reports.

### ADVANCED TRAINING

Training further to qualify the auxiliary policeman for extended duty under emergency conditions, is given in the advanced course. This should include such subjects as prevention of wilful offenses, including arson and sabotage; apprehension of criminals; searches; interviews; arrests; finger printing; preservation of evidence; presentation of testimony; and records.

### SUPPLEMENTAL TRAINING

This training should be given selected auxiliaries to fit them to relieve regular police in the more technical police duties, and should follow the curriculum of the regular police school in the community as it is given for regular police.

## G. TRAINING FOR BOMB SQUADS

Technical training for Bomb Squads is under preparation by the War Department, and will be separately announced when it is ready.



## H. AIR-RAID WARDEN TRAINING

Special duty training for Air-Raid Wardens should be planned to fit Wardens for the complete responsibility of a post and sector.

In addition to the basic training discussed in Section III, Wardens should receive the following training for "First Class" rating:

1. *The Air Raid Warden Service.*

Its place in Civilian Defense; its organization; its relations with other services.

2. *The Warden and His Work.*

Relations with citizens and their property; reporting incidents; taking command as "incident officer"; duties before, during, and after air raids.

3. *The Warden's Reports and Records.*

Forms for reports; when and how to dispatch them; how to keep post and incident records.

4. *The Warden Post.*

Equipment and fixtures needed; care of equipment; telephone procedure; map making; posting the map for incidents.

5. *Leadership.*

How to contact and help citizens; how to inspect homes, garrets, attics, etc.; gaining of confidence; how to forestall panic; assignment and delegation of work.

6. *Sector Geography (Problem).*

Warden to prepare and submit a detailed map of his sector, showing boundaries, names of streets with any special characteristics; physical character of each house; location of posts, hospitals, schools, apartment houses, etc., location of fire and police stations, and all facilities such as fire hydrants, call boxes, manholes, and sewer gratings; location of shelters; location of electric, gas, and water shut-offs or control valves.

*Text:* Handbook for Air Raid Wardens. Published by the Office of Civilian Defense.

## I. FIRE WATCHER TRAINING

The training of Fire Watchers, for the rating of "First Class" consists in practical exercises only. These should be conducted by the person so delegated by the Chief Air Raid Warden, and should take place in actual Fire Watcher posts on roofs or elevated places.

The training should proceed along the following lines:

1. *Knowledge of the sector of observation.*

Point out on the ground the areas seen on the maps, with all buildings, addresses, streets, roadways, etc., completely identified, by daylight. Point out the same by night.

2. *Methods of Observation.*

Explain the difference between random observation and systematic scanning of the sector, and the desirability of the latter. Give practice after dark by having umpires light matches at specified points, for identification by trainees. (This cannot be done when black-out is in effect.)

Hold critique after exercises.

3. *Reports.*

Explain where and how to make reports of things falling from aeroplanes; how to designate exact location, how to give direction indications; use of field telephone if same is to be employed.



The basic text is the *Handbook for Fire Watchers*, published by the U. S. Office of Civilian Defense and available through State Defense Councils after Jan. 1, 1942.

All should be shown the Training Film *Fighting the Fire Bomb*.

## **J. EMERGENCY FOOD AND HOUSING TRAINING**

The training for volunteers enrolled in Emergency Food and Housing Training is outlined in the Handbook for Emergency Food and Housing. Members may already possess some of the skills or knowledge necessary for preparing, transporting, and serving food, issuing clothing, locating temporary housing, and performing related welfare services, but all members must take the basic training to assure efficient performance in time of need.

Essentials will be taught in class work, practice exercises, and where practicable, by demonstration of the operation of room registry bureaus, large-scale kitchens, and relevant aspects of the work of welfare agencies. Characteristics of the population to be served will be analyzed. There will be instruction in procedures to be followed in relation to the other services of civilian protection. Teamwork will be developed.

The administration of this training is the responsibility of the unit leaders under direction of the leader of these units.

### **"FIRST CLASS" RATING**

Rating of "First Class" will be issued upon recommendation of unit leaders, approved by The Chief Air Raid Warden, and after actual training operation of the unit. Not more than half of the personnel of any unit will be rated "First Class."

## **K. DEMOLITION AND CLEARANCE CREW TRAINING**

The special duty training for members of Demolition and Clearance Crews consists mainly in learning thoroughly the contents of the "Handbook for Demolition and Clearance Crews," published by the U. S. Office of Civilian Defense, and available through State Defense Councils after Jan. 1, 1942.

The administration of this training is the responsibility of the unit leaders. They should supplement the instruction with material obtained from appropriate trade and engineering publications. Illustrations obtained from the photo files of W. P. A. demolition units, or of local engineering and wrecking companies, will be especially useful. The mainly low-cost housing projects of recent years have involved large-scale demolitions, and contact with the engineers in charge of such clearance or demolitions will prove helpful to unit leaders in preparing instructions.

Presentation of the material in an interesting manner is especially desirable. Pictorial treatment is valuable.

### **"FIRST CLASS" RATING**

"First Class" rating will be issued for members of Demolition and Clearance Crews, after actual training exercises, upon recommendation of Crew Leaders and approval of the Chief of Emergency Public Works. Not more than half of any crew shall hold the rating of "First Class."

## L. ROAD REPAIR CREW TRAINING

The special duty instruction for members of the Road Repair Crews consists mainly in learning thoroughly the contents of the "Handbook for Road Repair Crews." Ability to use the tools indicated in the Handbook should be developed by practical work with them, on simulated conditions. The handbook is published by the U. S. Office of Civilian Defense, and available through State Defense Councils after Jan. 1, 1942.

The unit leader is responsible for the training of his unit. He should search leading trade and engineering publications to find material, especially pictorial material, which will add interest to the instruction.

If any large-scale highway building operations have taken place in the neighborhood in recent years, photographs can undoubtedly be obtained from the files of the contractors in charge of construction. Contact with their engineering staffs will prove invaluable. Presentation of the material in an interesting manner is an essential.

### "FIRST CLASS" RATING

Rating of "First Class" will be issued upon recommendation of crew leaders, with the approval by Chief of Emergency Public Works, after actual operation of the crew in training exercises. Not more than half the members of any crew shall be rated "First Class."

## M. DECONTAMINATION SQUAD TRAINING

Proper Training of the Decontamination Squad will depend upon the issue of adequate equipment to carry out its functions.

The following specifications have been approved by the office of the Chief, Chemical Warfare Service, and will be procured for issue to members of decontamination squads by the Quartermaster General when funds are authorized for that purpose.

a. *Hood, Cotton, Protective*.—Similar in all respects to Hood, Worsted, Protective, Q. M. C. Tentative Specification, P. Q. D. #90, September 11, 1941, except that all wool has been eliminated in favor of Cloth, Cotton, Uniform, Twill, Type #4, Q. M. C. Tentative Specification P. Q. D. #33, February 17, 1941. Also cloth, cotton, knitted lining instead of cloth, knotted, wool. All cloth to be unbleached, desized and undyed.

b. *Suit, Cotton, Protective*.—Similar to Suit, Cotton, One-piece, Protective, except that buckles shall be eliminated, cloth shall be similar to Type #4, Q. M. C. Tentative Specification, P. Q. D. #33, February 17, 1941, to have two pockets and two hip pockets only. (Design to be similar to right breast pocket in specification.)

c. *Socks, Wool and Cotton Mixture*.—To be Type 1, Class A, of Federal Specification JJ-S-581A, August 22, 1938, Socks, Wool and Wool-Cotton Mixture.

d. *Boots, Rubber, Short, Heavy*.—Shall be similar to Federal Specification ZZ-B-556A, May 6, 1936, Boots, Rubber, Short, Heavy, except that strap and buckle shall be placed on leg of boot for tight fit at top of boot. Also, percentage of reclaimed rubber will be increased. A specification of a minimum mustard gas resistance test of 120 minutes will be made.

e. *Gloves, Cotton, Rubberized, Impermeable*.—Will be similar to Q. M. C. Tentative Specification, Gloves, Cotton, Rubberized, Impermeable, with the following revisions: the elastic on back of wrist will be eliminated. Each worker to be supplied with two heavy rubber bands to use over gauntlets to confine gauntlet at ends. The use of rubber bands will thus eliminate draw strings or elastic and consequently reduce the cost of the glove. It is understood that workers, after exposure to liquid mustard, will destroy used rubber gloves and be issued new ones. It is to be noted that no impregnated inner gloves are to be worn. Although this glove



is not as mustard resistant as the Glove, Rubber, Impremeable (anode type), it is readily procured from commercial manufacturers.

f. *Undershirt, Cotton, Protective*.—Similar in all respects to Q. M. C. Tentative Specification P. Q. D. #39, March 24, 1941, with the exception that "C-1a. *Fabric*" should be amended to read "The fabric shall be circular knit plain 1x1 rib of carded single cotton yarns, evenly spun and free from dirt, nibs, and motes."

g. *Drawers, Cotton, Protective*.—Similar in all respects to Q. M. C. Tentative Specification P. Q. D. #40, March 24, 1941, with the exception that "C-1a. *Knit Fabric*" should be amended to read "Shall be circular knit plain 1 x 1 rib of carded single cotton yarns, evenly spun and free from dirt, nibs, and motes."

### RECOMMENDED EXERCISES

1. Decontamination workers should practice putting on and removing protective clothing (and duty mask) following directions contained in the "Handbook for Decontamination Squads."
2. Mixing, spreading, and spraying slurry on streets and walls according to the directions contained in the Handbook.
3. Decontamination of equipment by slurry. (Handbook.)
4. Decontamination of clothing. Do not use actual clothing, only old rags, etc.

### "FIRST CLASS" RATING

Rating of "First Class" shall be issued upon recommendation of Squad Leaders, with the approval of the Chief of Emergency Public Works, and after actual operation of the squad in training exercises.

NOTE.—The functions of Decontamination Squads should not be confused with those of the Decontamination Station, which is a special type of Casualty Station designed for the care of persons suffering from chemical casualties.

## N. UTILITY REPAIR SQUADS TRAINING

It is assumed that members of these units will be thoroughly familiar with their technical jobs; accordingly, no technical training is planned for them, other than such brush-up instructions as the unit leader may prescribe.

Tests should be held for each operation, so as to determine positively the ability of the individual member to function competently and efficiently under emergency and black-out conditions.

Practice should be obtained in each test black-out, simulating breaks and dislocations of utility systems. The actual work of course will not be done, but the individual members should be called upon to state the steps they would take if breaks were reported at selected points.

Leaders should thoroughly familiarize themselves with city geography, obtaining for that purpose information through the office of the City Engineer or similar official.

In actual black-outs, as distinguished from test black-outs, there should be only such practice as may be had at the headquarters of the unit, inasmuch as they may be called to an alert at any moment.

Rating of "First Class" shall be issued upon recommendation of squad leaders, with the approval of Chief of Emergency Utilities. The qualification for "First Class" consists in the ability to make repairs of one class of line in a competent and professional manner. There is no limitation upon the number of "First Class" ratings in any squad.



## VI. SUMMARY OF TRAINING REQUIREMENTS

Group or service	Basic training required for award of insignia	Hours	Special duty training required for award of "First Class" rating	Hours if estimated
Staff.....	First Aid (10 hours); Fire Defense A; Gas Defense A; General Course; Drill (2 hours).	22	Map Reading; Municipal Organization; Utilities; City Geography; Law of Authority; Staff Operation and Functions; Messages and Reports; Inspections and Reviews.	Not estimated.
Messengers.....	First Aid (10 hours); Fire Defense A; Gas Defense A; General Course; Drill (2 hours).	22	City Geography; Black-Out Training; Message Procedure.	Not estimated.
Drivers.....	First Aid (10 hours); Gas Defense A and B; General Course; Drill (2 hours); Night and Convoy Driving; Black-Out Driving; Map Reading; Emergency Road Repairs; Test and Optional.	40	Training exercises and volunteered work; test to be arranged by local authorities.	Not estimated.
Auxiliary Firemen...	First Aid (10 hours); Fire Defense A and B; Gas Defense A; General Course; Drill (5 hours).	32	Special Initial Training; Advanced Training; Supplemental Training. See sec. V.)	50.
Rescue Squads.....	First Aid (20 hours); Fire Defense A and B; Gas Defense A and B; General Course; Drill (2 hours).	42	Special Training Course. (See sec. V.)	40.
Auxiliary Police.....	First Aid (10 hours); Fire Defense A; Gas Defense A and B; General Course; Drill (5 hours).	28	Special Training Course. (See sec. V.)	50.
Bomb Squads.....	Gas Defense A; General Course.....	7	To be separately announced.....	Not estimated.
Air-Raid Wardens...	First Aid (10 hours); Fire Defense A; Gas Defense A and B; General Course; Drill (2 hours).	25	Special Training Course. (See sec. V.).....	Not estimated.
Fire Watchers.....	Fire Defense A; Gas Defense A; General Course; Drill (2 hours).	12	Knowledge of Sector; Methods of Observation; Reports.	6.
Emergency Food and Housing.	Gas Defense A; General Course.....	7	Recommendation of Unit Leader, approved by Chief Air Raid Warden, after operation. (See sec. V.)	Not estimated.
Medical Auxiliaries...	First Aid (20 hours); Gas Defense A; General Course; Drill (2 hours) plus special training as is directed by the Office of Civilian Defense.	29 plus	None announced.....	None announced.
Nurses' Aides.....	First Aid (10 hours); Gas Defense A; General Course; Drill (2 hours) plus Nurses' Aide Course of American Red Cross.	19 plus	None announced.....	None announced.
Demolition and Clearance.	Fire Defense A; Gas Defense A; General Course; Drill (2 hours).	12	Issued after actual training exercises, upon recommendation of Crew Leader and approval by Chief of Emergency Public Works.	Not estimated.
Road-Repair Crews...	Fire Defense A; Gas Defense A; General Course; Drill (2 hours).	12	Issued after actual training exercises, upon recommendation of Crew Leader and approval by Chief of Emergency Public Works.	Not estimated.
Decontamination Squads.	First Aid (10 hours); Gas Defense A and B; General Course; Drill (2 hours).	22	Issued after actual training exercises, upon recommendation of Squad and Leader and approval by Chief of Emergency Public Works.	Not estimated.
Utilities - Repair Squad.	Gas Defense A; General Course.....	8	Issued upon recommendation of Squad Leader, with the approval of the Chief of Emergency Utilities.	Not estimated.

## VII. COMBINED TRAINING

When, in the opinion of the Commander of the U. S. Citizens' Defense Corps, the various units have reached sufficient competence within their own units to permit them to perform jointly with other units, he should arrange to have groups of units practice together, first during the daytime, and later at night, at the first available practice blackout.

It is to be remembered that the U. S. Army, through its Interceptor Commands, has the sole authority to order a blackout. The desire of the local commander to have combined training in a practice blackout may, however, be submitted through the Local and State Defense councils, to the Regional Office of Civilian Defense, and so to the Interceptor Command.

Combined training should be based upon problems devised in advance and put on with every effort for reality. Messages, prepared in advance and marked with the time they are to be delivered, should be the means of controlling the action. They should be delivered to the Control Center, whereupon they will have the effect of the appropriate yellow, blue, or red, or white warnings. Reports of bombfall, phoned in to the Control Center, should actuate the movement of such equipment (other than emergency fire equipment) as may be necessary or convenient. Volunteer civilians may even agree to act as "casualties," and to be cleared to the appropriate units or stations of the Emergency Medical Field Forces.

Such combined training should be well explained to the public as well as to the volunteer workers, well in advance, as well as to the local press and to the leaders of local opinion. Such exercises can be of the greatest value in "selling" the public on the value and operation of the Civilian Protection Services.

Ingenuity should be used to obtain verisimilitude and closeness to actuality in such combined training.

After each such exercise, critiques should be held, first among the chiefs of services, then among the heads of units, then among the members themselves. The greatest good of the combined training will be obtained from these critiques, provided they are conducted in a spirit of open-mindedness, without either unduly bitter criticism or unduly boastful pride.

Naturally, in actual blackouts, there will be no such public exercises.

## VIII. GRADUATIONS AND AWARDS

The completion of either basic or special duty in any class presents an opportunity to build morale and esprit de corps, by holding graduation exercises.

The award of insignia and certificates should be the central feature of such graduations. Speakers should be sought who can properly signalize the achievements of the graduates, and point to them the ways in which their service is of patriotic or national value.

Graduation exercises should be held in a hall of appropriate size. Under blackout conditions, crowds should be kept small, and big affairs avoided. Under other circumstances, larger gatherings may be held and speakers of greater fame and reputation can be obtained.

At graduations, every effort should be made to interest Mayors, State Officials, and local and other dignitaries. The work of the group should be explained at some point in the program, for the benefit of visitors and friends of graduates.

Obviously, this can be run into the ground, but the opportunity should not be missed.

Special efforts should be made to get local newspapers to "cover" the event, especially with photographers, if possible. The award of certificates should be made individually, if possible, with the dignitary awarding the certificate doing so in a manner calculated to make a lasting impression upon the graduate and the visitors alike.

Similar opportunities exist in the holding of formal reviews or, to a lesser extent, parades. The essential parts of a review are as follows:

- The assembly.
- The salute to the color.
- The presentation to the commander.
- The march past.
- The honor to the reviewing officer.
- The break-off.

Simple evolutions by which such a review can be devised will be found in the Drill Manual of the U. S. Citizens' Defense Corps. The incentive to securing finish and polish which is to be given by the prospect of a public review is enormous.

It has happened that a group of raw recruits, reporting on July 1 at a strange post, were able to present a creditable review on July 4. Given the conditions of drill under blackout and training programs, it should be possible to put on a creditable review for any Citizens' Defense Corps by the time the basic and special training of one unit of each classification is completed.



## **IX. HOW TO PURCHASE OFFICIAL CIVILIAN DEFENSE INSIGNIA**

All designs of insignia have been patented by the Office of Civilian Defense to prevent their use by unauthorized persons.

Insignia that are available—cloth arm bands, cloth sleeve insignia for uniforms, embroidered cloth or metal uniform collar and cap emblems, embroidered and celluloid insignia of rank, metal civilian-dress lapel buttons, automobile insignia plates.

### **PERSONS ENTITLED TO USE INSIGNIA**

Only enrolled Civilian Defense Workers who have satisfactorily completed prescribed training courses.

### **WHO CAN PURCHASE INSIGNIA**

Responsible officers of State Defense Councils for the local Defense Councils within their respective States.

### **WHO MUST APPROVE ORDERS**

Regional Civilian Defense Directors. (They may delegate this power to State Defense Councils.)

### **FROM WHOM INSIGNIA CAN BE PURCHASED**

Only manufacturers licensed by the Office of Civilian Defense. None will be sold in retail stores.

### **PRICES DO NOT DEPEND ON QUANTITY PURCHASED**

Manufacturers are licensed to sell only at the listed prices. This insures equality on all orders both large and small.

### **SOURCES OF FUNDS**

No Federal funds are available at this time, for purchase of insignia. State and local councils must collect the money from their members or other sources.

### **TEMPORARY INSIGNIA**

The following telegram and discussion are of interest:

**CONFIRMATION OPERATIONS LETTER NO. 12**

Sent by Telegram December 10, 1941

*To All Regional Directors:*

1. Please transmit immediately to all State Defense Councils the following operation Letter Number 12 re temporary identification defense workers who have not completed training courses:

"Temporary identification arm bands desirable for all enrolled volunteer civilian defense workers who are on duty but have not had time to complete instruction courses. Recommend purchase from local sources temporary white cloth arm bands three inches deep, eighteen inches long, bearing only printed initials "CD" with no triangle or circle. Use of official arm bands and emblems as described Operations Letter Number 6 Revised should be permitted only after prescribed training. Confirmation by letter follows."

2. Above does not change any provisions of Operations Letter No. 6 Revised, dated December 5, 1941.

3. Above provides a uniform method of handling temporary emergency identification for enrolled volunteer civilian defense workers who are now on duty but who are not permitted to wear official insignia because they have not completed the prescribed training courses.

4. Funds for purchase of suggested temporary arm bands must be procured from individual workers or defense councils. Congress has not authorized this office to furnish arm bands or funds.

5. States and communities wishing to provide other means of temporary identification such as cards, photographs, etc., are at liberty to do so instead of using arm bands.

## X. RECORDS OF TRAINING

It is essential that records be kept of the training given, and of the persons trained, the courses that they have had, the federal recognition awarded, the insignia authorized, the special-duty courses taken, and the First Class ratings awarded.

Such records should be permanently kept in the Civilian Defense Schools, and upon the occasion of graduation a list of graduates of each course should be furnished by the Schools to the Personnel Section of the Staff of the local Citizens' Defense Corps Unit.

A form has been prepared for issuance to the enrollee. Such forms are available from State Councils of Defense. They must be countersigned locally by proper authority so as to enable the enrollee to purchase the arm band or equipment to which he is entitled.

The general form of record to be kept for each enrollee within the Civilian Defense School appears on page 34. This form should be adapted if necessary to the needs of the local community but should include all the information called for. The form can easily be mimeographed locally; it will not be supplied in quantity.



# **TRAINING RECORD** **CIVILIAN DEFENSE SCHOOLS OF YOUR TOWN**

Name of enrollee.....

Street address.....

City and State.....

Date enrolled.....

Awarded basic insignia.....

On date.....

Awarded First Class rating on date.....

## RECORD OF COURSES

Subject	Dates attended	Total hours	Course completed	Instructor's initial







# TRAINING AUXILIARY FIREMEN



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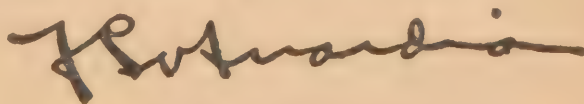


## FOREWORD

Our enemies, in their mad career of international crime, have made fire once again a weapon of war and are turning it, not merely against military objectives, but against the homes of men and women in cities and towns.

The auxiliary fire service is the answer.

The training program set forth here is fundamental, and of the greatest possible value to our Nation, both in war and in the peace to follow. I urge its prompt adoption.

A handwritten signature in dark ink, appearing to read "J. B. Starnes", with a stylized flourish at the end.

*U. S. Director of Civilian Defense.*

# TRAINING AUXILIARY FIREMEN

## NEED FOR AUXILIARY FIREMEN

The assigned duty of a fire department in time of an air raid is that of rescue work and major fire defense. Due to the possible extent of fires that may be set by incendiary bombs during an air raid, it will be necessary to supplement the regular fire department with carefully selected and trained Auxiliary Firemen.

Once selected, the training of Auxiliary Firemen to assume their duties as supplementary fire fighters becomes the responsibility of the chief of the fire department. This training may be done by designated officers of the department or by trained instructors who are members of the department, but who may or may not be ranking officers. The latter case exists in many departments where training is delegated to firemen selected for their natural ability to teach and who are trained definitely for that purpose.

## SELECTION OF MEN

As great care should be taken in selecting Auxiliary Firemen as in selecting candidates to become regulars. Since they will not have a chance to gain experience through fighting the ordinary run of fires, but rather will be involved in the fighting of major fires as their first experience, the equivalent of experience must need be obtained through training. Consequently, an auxiliary, among other things, should be decidedly amenable to training, that is, he should realize the responsibility being placed upon him and should respond to training readily.

Much will depend upon the general intelligence of an Auxiliary Fireman as to whether or not through training he is able to assume the responsibilities common to regular firemen. Thus, men with mechanical ability may be selected to be trained for pump operators, those accustomed to climbing for ladder work.

A second determining factor in the selection of an Auxiliary Fireman is his desire to serve. The fire service during an air raid has proven to be a most exacting one and only those who sincerely desire to aid their fellowmen in an extreme emergency and at a great risk of their own lives can be relied upon for efficient service.

Men selected for the auxiliary fire service should understand that they are to supplement and not to supplant the regular fire service. Their services will terminate with the emergency, consequently, they must be satisfied with the extent of the auxiliary service.

If they be carefully selected, Auxiliary Firemen will enter into training and into the service with a spirit of patriotism and a desire to cooperate to the highest degree.

To bring about a spirit of cooperation, the regular firemen should take advantage of every opportunity to welcome the auxiliaries and to assist them in getting acquainted with the fire service equipment, apparatus, and quarters. When possible they should assist in the training, not to spare the auxiliary from the experiences, but to aid him in doing things accurately and safely.

## TRAINING REQUIRED

Since the auxiliaries serve to supplement the regular fire service, their job will be to do the more-or-less elementary operations now done by the regulars, thus leaving the regulars for the more intricate operations. To assume this responsibility, the auxiliaries must need be trained in the fundamental operations of fire fighting.

Fundamentals in the fire service may vary to some extent according to the differences in localities, yet they will be the same, generally speaking. Consequently, it will be the purpose of this guide to set up certain fundamental training that will apply generally to all fire departments, then the instructor may vary his training to suit the particular needs of his city or community.

## TRAINING RESPONSIBILITY

The responsibility for training Auxiliary Firemen should be assumed by the chief of the fire department. He may delegate the work either to his commanding officer, or to one or more who are selected and trained to serve as fire service instructors. In either case the responsibility for actually teaching becomes one of the most important in the fire service. Upon the work of the instructors depends the efficiency of the auxiliary fire service when the emergency occurs.

To aid in the assumption of the responsibility of teaching, the following qualifying characteristics of a fire department instructor are set forth: He must—

1. Possess a favorable personality.
2. Be tactful.
3. Have patience.
4. Be sincere.
5. Be sympathetic.
6. Know the subject to be taught.
7. Understand his learners.
8. Know how to teach.
9. Have the confidence of those he teaches and those he serves.

The above qualifications have been designated by firemen themselves, and certainly apply to training auxiliaries. To teach is to impart information in such a manner that the learners are able to understand and make such information a part of their own knowledge. That means that the one who does the teaching must pretty well qualify on the above-named characteristics if he is to do a good job, and only the best will suffice in training auxiliaries.

## THE TRAINING SET-UP

Four factors are necessary for any successful teaching job. They are:

1. A group of men who desire to learn.
2. Reliable information.
3. A qualified instructor.
4. Facilities for carrying on the training.

In the case of training Auxiliary Firemen, the first factor is taken care of in the selection of the men and the interest thereby developed.

Reliable information for training Auxiliary Firemen consists of fairly well-accepted practices, and will be considered as a training outline further on in this discussion.

The qualifications of the instructor have been presented. However, one determining characteristic should be emphasized, since it requires definite training, and that is "Knowing How to Teach." Teaching is just as much a definite job as fighting fire, operating a pumper, inspecting a building, or any other job. It takes a particular type of person to do the job and then he must be trained to do it the proper way. In other words, if he has the other eight characteristics listed he may be trained to teach. It is not the purpose of this guide to train one to teach, but rather to aid in doing the job after he has been taught to teach.



It would be exceedingly unfair to set up requirements unless it is possible to show a prospective teacher how he may qualify to satisfy those requirements. Here is a method by which instructors may obtain "Teacher Training." Every State in the Union is prepared, with cooperation of the United States Office of Education to give exactly the type of training designated above. There is a short course designed for training experienced men how to teach. For information as to how to obtain this service those interested should contact the Vocational Division, Office of Education, Washington, D. C.

The last factor, a training place, may be worked out in each fire department, and only general suggestions will be given. Auxiliary firemen should be trained in the fundamentals of fire fighting. This requires that they be trained on the type of equipment they will be expected to use. In many instances, the emergency equipment may not yet be available; this need not prevent training. The auxiliaries may be well trained, on regular equipment.

They may be trained in company quarters, but preferably at the regular training station. Being trained in the regular department training station will add materially to the interest of the men and to their pride in being selected for the job.

In all cases auxiliaries should participate in actual training operations. The purpose of the training is "to produce skill and safety." Training is considered a most important factor in developing safety. In fact, the highest degree of safety is developed by training in the right practices until it is practically impossible for the men to do things otherwise.

## THE TRAINING COURSE

It is recommended that training be given Auxiliary Firemen in three stages each designed to meet a definite need. The three stages of training and the level of work for which it will prepare the men are as follows:

1. *Initial Training*.—To prepare Auxiliary Firemen for immediate use in case of an air raid; their work at this level to be limited to ground work and to include such operations as laying hose lines and handling hose, carrying, raising and placing ladders, and supplying regular firemen with tools and equipment.
2. *Advanced Training*.—To further prepare auxiliaries for the more hazardous operations of fire fighting, that of climbing ladders, entering buildings, advancing hose lines, and such other operations as are incidental to fire extinguishment.
3. *Supplemental Training*.—To further increase the efficiency of the auxiliaries in not only aiding but relieving the regular firemen. Although set up as a separate division, any subject listed as supplemental training may be given in either the Basic or Advanced Course, if and when needed to meet local needs. Supplemental training will serve also as an interest-holding measure.

It would seem extremely discouraging to candidates for the auxiliary fire service if the entire training course were required for qualification. It would seem just as impossible to expect service from these men until the entire training had been finished, consequently dividing the training into the indicated parts is preferable. The result will be almost immediate availability of men so trained, and a much better interest will be maintained.

Caution should be taken that no Auxiliary Fireman be assigned to work requiring ability beyond his training. The close cooperation of regular officers and auxiliaries is the best safeguard.

No attempt has been made here to set up exact lessons according to class periods, since circumstances may make it impossible to follow such a schedule. A two-hour period works well and it is hereby recommended. Most training of Auxiliary Firemen will need be done in the evening, due to the fact that they will be employed at other jobs.

All this is a matter of local adjustment and should be worked out by the officials of the department. To aid in setting up a training program, the following time estimates are suggested:

Basic Training-----	20 hours.
Advanced Training-----	30 hours.
Supplemental Training-----	as desired.

## AUXILIARY FIRE SERVICE TRAINING

### BASIC COURSE

#### **1. Fire Department Organization:**

An introductory lesson setting out the purpose of the auxiliary fire service, the Auxiliary Fireman's job and the relation of the auxiliary fire service to the regular service. Emphasis should be placed upon the fact that the auxiliary service is intended for an air raid, or other emergency incident to war, and that it will not be called upon except in such emergencies. The status of liability in each state should be clearly understood, and all rules, regulations, and matters of discipline should be definitely established as pertaining to the local fire department, and its auxiliaries. If not done so before this time the oath of allegiance to the fire service should be taken at this point.

#### **2. Apparatus, Tools, and Equipment of the Fire Service.**

The purpose of this lesson is to acquaint the auxiliaries with the apparatus, tools, and equipment with which they will work. It should acquaint the auxiliaries with the fire truck, hand tools, ladders, hose and hose appliances, hand extinguishers, lighting equipment, first-aid equipment, etc., definitely fixing in their minds the proper names and intended uses.

#### **3. Responding to an Alarm.**

This lesson will depend almost wholly upon the local situation, but should acquaint the auxiliaries with the regular fire-alarm system and the emergency set-up. Auxiliaries should be taught how to determine the location and possible route to the fire, how to leave the station, and other general and specific activities incident to responding to an alarm.

#### **4. Hose Practices.**

A discussion of the purpose of hose in fire fighting, the requirements incidental to different kinds and sizes of fires and the methods of fulfilling these requirements. Definite instruction and individual and group practice should be given on hose loads, hose load finishes, hose carries, catching the hydrant, operating the hydrant, hose lay-outs, breaking and coupling hose, attaching nozzles, use of hose clamp, taking up hose, and other operations included in elementary hose practices.

#### **5. Ladder Practices.**

A discussion of ladder requirements in fire fighting and operations necessary to meet these requirements, followed by definite instruction and practices in carrying, raising and lowering both the straight and the extension ladder. Emphasis should be placed upon the development of individual skills and teamwork to safety.

#### **6. Rope Work.**

Although most fascinating, rope work should be limited to such knots and ties as are most commonly used, and that can be used efficiently in blackout conditions. Instruction and practice should be given in making knots and hitches, coiling rope, and in applying knots and hitches to the hoisting of tools and equipment.



## **7. Blackout Conditions.**

All the above-designated practices should be done under blackout conditions when taught. All such operations should be coordinated by practicing the completed training under a blackout including making the run, laying hose, setting ladders, reloading, and returning to the station, thus completing the first stage of training.

## **8. Safety Precautions.**

Although taught in connection with each item of training, this last lesson of the series may be used profitably in a summarizing of safety precautions, such as proper dress, individual precautions, group precautions, and the responsibility of the group to the public. The completion of the preceding lesson will afford many opportunities for applying such precautions.

If Auxiliary Firemen have not had a regular or emergency course in First Aid Training, each should be taught how to care for scratches and minor injuries on the spot and how to report to the proper agency for first-aid treatment. Emphasis should be placed upon proper methods to prevent injury in doing various jobs. Just as soon as possible all auxiliaries should be given a regular or emergency First Aid Course.

# **ADVANCED TRAINING**

## **1. Added Responsibilities.**

Auxiliary Firemen should be brought to realize the added responsibilities incurred approaching and entering buildings and taking a part in fire fighting. This lesson should include a definite description of fire-fighting practices, such as entering buildings, hazards involved, in applying water to the fire, and should serve as an introduction to the lessons to follow in this advanced training series. Air raid complications should be anticipated.

## **2. Forcible Entry Practices.**

Auxiliary Firemen will need to practice the same methods of forcible entry as are used by the regular fire service. They should be taught how to open locked doors and windows, how to open roofs, floors, ceilings, walls, etc., to reach the fire, and how to break glass from a window safely and efficiently. Although actual practices cannot always be given in these operations they may be simulated to the extent that when the opportunity comes, the job may be completed efficiently and safely.

## **3. Minor Extinguishment Practices.**

The auxiliaries should be taught minor fire practices, so that they will know how to extinguish a fire that has not reached major proportions, and so that they may help others. The instruction should include the intended use and operation of the available types of portable hand-pump water units and the soda-acid, foam, loaded stream, carbon tetrachloride, and other types of portable hand extinguishers. Actual operations of these extinguishers should be provided.

## **4. Ladder Practices.**

Additional ladder practices should now be given. Auxiliaries should be taught to climb ladders. They should also be taught to carry a roof ladder up to and place it in position on a roof. Special ladder practices should be given as local conditions require. If available the use of the folding attic ladder should be taught. If called upon for using more than the auxiliary equipment, the auxiliaries should be taught to carry, raise, and lower long extension ladders with poles (tormentors). Additional ladder practices may include such operations as anchoring ladders. Safety precautions should be emphasized in each and every practice.



### **5. *Advancing Hose Lines.***

Instruction should be given in laying out hose at a fire, methods of using wyes in dividing lines and application of hose carries to advancing lines. Actual practices should be afforded in advancing hose lines up stairways, fire escapes, ladders, elevator shafts, etc., and hoisting hose lines to upper stories of buildings. The use of tools and appliances and safety precautions should be emphasized.

### **6. *Combined Hose and Ladder Practices.***

This lesson includes the combining of hose and ladders in operating ladder streams, for example, and in making appliances such as emergency cellar pipes, ladder streams, and such other miscellaneous combinations as may be required.

### **7. *Salvage Practices.***

Although the Auxiliary Firemen may not be called to do much salvage work, yet fires may occur where food supplies and other essential materials are stored. So they may be ready to protect such materials against damage, they should be taught some salvage work. This should include types and sizes of covers, folding covers, carrying and throwing practices, and general salvage procedure.

### **8. *Care of Assigned Equipment.***

To maintain efficiency of equipment and to uphold the morale of the auxiliaries and the respect of the public, they should be taught the proper care for fire station, apparatus, small tools, ladders, hose, clothing, and the protection of water-bearing equipment against freezing.

### **9. *Fire-Fighting Practices.***

Having now practically finished the basic and advanced courses, Auxiliary Firemen should be taught to organize the training given them by coordinating the operations learned in planned fire-fighting practices. In other words, they should be given "skull practice" in fire fighting. The group instruction should include apparatus, and men to respond, route to the fire, sizing up the fire, determination of needs, method of attack, and air raid complications. All this may be done on a blackboard, and will develop thinking scarcely possible by any other method.

### **10. *Fire-Fighting Hazards.***

A summary of fire-fighting operations will bring to the minds of the auxiliaries things that might happen. Such items should be considered as expectant fire-fighting hazards, and should include structural hazards, those due to fire and explosions, gaseous area hazards, electrical hazards, and such others as may be encountered in local situations and during an air raid. Not only should the men be taught to recognize such hazards, but also how to cope with them.

## **SUPPLEMENTAL TRAINING**

The need of supplemental training for Auxiliary Firemen will depend entirely upon local conditions. A part of such training may be given along with related subjects in either the basic or advanced course, or it may require a course in its own right. If so, then its purpose as a part of the training of Auxiliary Firemen should be established. It may help make the men more efficient at their work, and it will serve to retain interest.

### **1. *Driving and Placing Apparatus.***

This and the following lesson may be given to the entire group or to a few whose ability warrants it. In either case it should include instruction and practice in starting the motor under all conditions, leaving the station, driving practices, and spotting the truck at the water supply. In addition all these should be taught under anticipated air-raid conditions.

## **2. Pumping Unit Operation.**

Included should be definite instruction in pump design and intended use, drafting operations, operation from a hydrant, pump-operation practices, and precautions in doing same.

## **3. Producing Fire Streams.**

Much efficiency may be lost by men knowing only how to operate hose lines and yet not know how to produce fire streams. They should be taught what is required of a fire stream to extinguish a fire and how fire streams may be formed to meet these requirements. The instruction will include the proper nozzles and nozzle pressures to use to produce the desired stream, and how to handle fire streams. Relaying practices to transport water from a distant source, and Siamesing to produce heavy streams will be a part of the instruction.

## **4. Methods of Using Available Water Supplies.**

It will be necessary to insert this lesson early in the training program, and this should be done if and when the occasion arises. In addition to the regular water supply it should include definite instructions in locating and gaining access to such available water supplies as private wells and tanks and emergency supplies such as cisterns, basements, domestic tanks, swimming pools, catch-alls, lakes, streams, ponds, tank trucks, and tank cars. Sanitary precautions in handling same should be emphasized.

## **5. Rescue Practices.**

Although designated as a special duty each Auxiliary Fireman should have some preliminary training in methods of rescue from a burning building. Their cooperation with rescue squads and the medical service should be emphasized.

## **6. Using Special Equipment.**

In order to cooperate with regular firemen and other groups, auxiliaries may be taught to use any special equipment that may be available, such as special lighting equipment, acetylene and other cutting devices, foam generators, marine equipment, and other miscellaneous special equipment.

## **7. Controlling Incendiarities.**

Although listed as supplemental training, this feature of air raid fires may need be taught to auxiliaries quite early in the program, especially in regions most vulnerable to air raids and sabotage. The training should include such items as the nature of incendiary bombs and incendiary agents, air raid conditions, sabotage practices, and the method of extinguishment and control.

# **SOURCES OF INFORMATION**

*Auxiliary Firemen's Handbook.*—An illustrated manual of services that will be required of Auxiliary Firemen, published by the Office of Civilian Defense and available from the State Defense Coordinator.

*Fire Protection for Civilian Defense.*—Fire defense expectancy incidental to air raids and methods of combating same. Published by the Office of Civilian Defense and available from the State Defense Coordinator.

Many States and cities have usable training manuals that may be adopted to the training of Auxiliary Firemen. It is the duty of the fire department officials to procure the best information available and adapt it to the training situation at hand.





***Fire Defense Section***

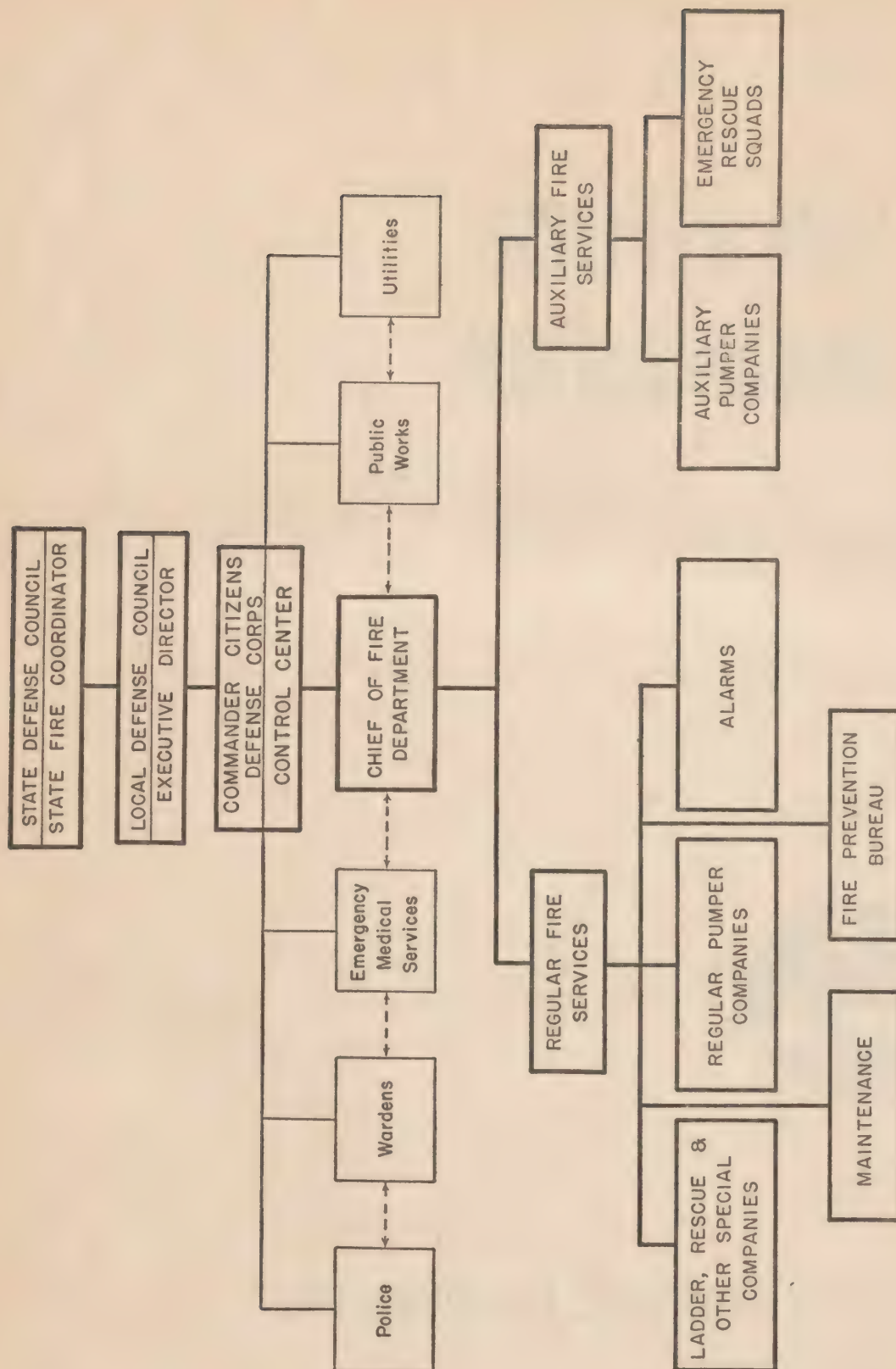
***Bulletin No. 1***

# **FIRE DEFENSE ORGANIZATION**



**UNITED STATES OFFICE OF CIVILIAN DEFENSE**

**Washington, D. C.**



# FIRE DEFENSE ORGANIZATION

The possibility of incendiary bombing attacks by the enemy makes it imperative that an auxiliary fire-fighting force be organized at once in each community.

Peacetime fire departments are not organized with a view to fighting many large fires at one time, and rightly so. The tangible evidence of havoc wrought in London and other English cities by incendiary bombs makes it evident that a normal fire-fighting organization cannot cope with wartime conditions. To bring the realization of what one large fire can do a bit closer to home, the recent rubber fire at Fall River, Mass., is cited, where nearly 100 fire companies worked. A water-front fire in Jersey City brought out 26 companies, and more than 60 companies responded to a fire in a large Baltimore cork factory. The purpose of an auxiliary fire force is to provide men and equipment to make the fire department better equipped to fight a number of large fires simultaneously set by enemy action.

## STATE FIRE DEFENSE COORDINATION

The first and perhaps most important step to be taken at the State level in fire defense planning is the immediate appointment of a State Fire Coordinator, if such action has not already been taken. The State Fire Coordinator is to provide the executive direction and coordination for the fire defense plans of the State. In some States the Fire Marshal may be designated State Fire Coordinator because of his authority under existing State laws. In any event the activities of the State Fire Coordinator should be coordinated with those of the State Fire Marshal.

The exact duties of State Fire Coordinators will differ in the several States but some of his principal duties are enumerated here for your guidance.

1. Define local fire defense districts. These will usually follow established political boundaries. The Coordinator should be authorized, however, to ignore such boundaries where efficient operation requires, such as in a metropolitan area served by several fire departments. In all cases, however, centralization of direction must conform with general civilian defense plans of the area.
2. Prepare a State-wide list of personnel and facilities available for fire fighting. Copies of the questionnaire forms submitted to the Office of Civilian Defense on apparatus in cities of over 5,000 population are on file in each State Defense Council Office. These data, which should be kept up to date, should be on file in each principal control center in the State.
3. On the basis of fire defense districts and control center areas, make plans for developing and coordinating mutual aid between communities or districts.
  - (a) Study legislation necessary to authorize mutual aid and define liabilities and responsibilities of municipalities concerned.
  - (b) Draft model agreement for use where necessary between cities cooperating in mutual-aid plans.
  - (c) Establish running schedules for fire departments in each fire defense area for scheduling mutual-aid responses.
  - (d) Indicate precedence of authority of individual fire chiefs responding to mutual-aid calls.
4. Where necessary, the State Fire Coordinator should have authority to enter into agreements with similar officials in neighboring States concerning mutual aid.



5. Coordinate fire training on a State-wide basis so that all firemen whether regular, volunteer or auxiliary will be able to work together most effectively. Many States already have well-established training programs which could be expanded to include courses essential to wartime fire fighting. Actual training of auxiliaries should be done locally.

The first act of the State Fire Coordinator should be to advise each municipality in his State to organize an auxiliary fire force at once. A section of this bulletin outlines briefly the primary steps to be taken in organizing such an auxiliary force.

## **ORGANIZING AN AUXILIARY FIRE FORCE**

### ***Relationship of Fire Department to Other Civilian Protection Services***

Obviously, the operations of a fire department and its auxiliary fire force must be coordinated with the operations of other civilian protection services. Any other plan would lead to utter confusion when operating under air raid conditions. In each community or defense district there will be a Commander Citizens Defense Corps whose responsibility it will be to integrate, coordinate and direct the services of all protection agencies, such as the police and fire departments, the health department, public utilities and medical services during an air raid.

The Commander Citizens Defense Corps directs operations through the medium of a control center. The Fire Chief will be responsible for fire-fighting operations under the direction of the Commander Citizens Defense Corps, and all calls for and responses to alarms during air raids clear through the control center. A publication explaining the operation of a control center in detail is issued by the Office of Civilian Defense under the title "The Control System of the Citizens' Defense Corps."

### ***Number and Location of Auxiliary Companies***

The first step in organizing local fire defense is to determine the number of fire companies needed to provide protection against air borne incendiaries. This determination must be made locally on the basis of such considerations as the adequacy of peacetime protection, predominance of frame, brick or masonry construction, special local hazards and vulnerability to aerial attack because of geographic location.

While no set rules can be established for determining the number of fire companies needed, the following formula has been adopted by the Office of Civilian Defense in estimating the approximate number of pumpers required to equip companies.

- (a) For each regular pumper company in cities of more than 200,000 population, there should be two auxiliary pumper companies.
- (b) For each regular pumper company in communities of less than 200,000 there should be one auxiliary pumper company.

The location of auxiliary fire companies must also be based on local considerations. It should be kept in mind, however, that it is inadvisable to house auxiliary companies with regular companies because: (1) It is essential to minimize equipment losses resulting from bombing; (2) Establishing separate locations for auxiliary companies reduces the area which any one company is required to cover; (3) Streets may be damaged by bombing so as to make certain areas inaccessible from a particular fire station.

## ***Number of Auxiliary Firemen Needed***

The number of auxiliary firemen required may be calculated from the number of companies provided and the basis on which the auxiliaries are put into service. For example, it is probably desirable that auxiliary firemen serve in shifts following the regular platoon schedule in effect in the department.

In figuring the total number of men required, both regular and auxiliary, one method is to estimate seven men per shift for companies in or near a high-value district and five men per shift for pumper companies in other districts.

It is probably necessary to enroll a larger number of men for service on the auxiliary companies than are required in regular fire companies. This is based on the possibility that all of these men may not be available on every occasion when the community is "alerted." A sufficient number of men must be provided always to take care of illnesses or unavoidable absences. The number enrolled should also be sufficient to allow for loss of men who may be called up for military service.

## ***Enrollment of Auxiliary Firemen***

Begin at once to recruit volunteers for the auxiliary fire force. Careful consideration must be given to the type of men selected for this service and only those chosen who are dependable and willing to sacrifice time and energy to protect their community.

Remember, these men will be entering private property and as much care should be taken to check their character as is taken in the case of regular firemen. Every man accepted for the auxiliary fire force should be fingerprinted and the prints checked through local law enforcement officers.

The auxiliary fireman's job will at times be arduous. For this reason each enrollee should be given a physical examination to determine his physical fitness. The standards already fixed in most large departments will provide a guide in examining auxiliaries. In those communities where no physical standards have been established, local physicians should be consulted or the standards of some nearby city adopted.

Most fire departments have rules and regulations governing the conduct of members of the department. These rules should be expanded or new rules drafted to cover the conduct of auxiliaries. The relationship between regular and auxiliary firemen should be established by these rules and provisions made for the orderly administration of the auxiliary fire force.

## ***Training of Auxiliary Firemen***

Training courses for regular firemen have been established for many years in a large number of fire departments. It is not intended that those courses be replaced by any courses suggested for the training of auxiliaries but rather it is suggested that they be enlarged to include data pertinent to wartime fire fighting. This can be accomplished easily in those States where firemen's training courses have been coordinated at the State level. If no State training program has been established, however, local fire departments should not wait for such action before beginning the training of auxiliary firemen.

The Office of Civilian Defense has issued three publications which will be of considerable assistance in training members of the auxiliary fire force. These may be procured from the State Defense Council or directly from the Superintendent of Documents, Government Printing Office, Washington, D. C. These publications are "Training Guide for Auxiliary Firemen," "Handbook for Auxiliary Firemen" and "Fire Protection in Civilian Defense."



## ***General Instructions***

No municipality or local defense council should delay even a day in the organization of an auxiliary fire force and in bringing the regular fire department up to full peacetime strength. Most effective use of the auxiliary force can only be made if the regular department has a full complement of men and equipment.

There are many local sources of advice, information and counsel to which the local defense council can turn in working out its fire defense plans. The State Defense Council and the United States Office of Civilian Defense will make further instructions available from time to time but local authorities should proceed immediately without waiting for specific orders on all details of organizing an auxiliary fire force. Though the auxiliary fire force may never be called into action in your community, such a call must be anticipated.







# GUIDE FOR THE TRAINING OF VOLUNTEER NURSES' AIDES



*Prepared by the American Red Cross*



*in collaboration with the U. S. Office of Civilian Defense*

To meet the anticipated need for the expansion of nursing facilities during the period of the national emergency, the American Red Cross has been asked by the U. S. Office of Civilian Defense to train 100,000 Volunteer Nurses' Aides during the coming year. In a recent letter to the Chairman of the American Red Cross, the Director of the U. S. Office of Civilian Defense stated:

"We are confronted with a steady depletion of the nursing services of hospitals and health departments, due in part to the requirements of our military establishments at a time of rapidly increasing needs for civilian defense . . .

"To meet the emergency needs of the civilian population during the national emergency, I would therefore suggest that the Volunteer Nurses' Aide Corps of the American Red Cross be greatly expanded throughout the country."

This challenge was accepted immediately by the American Red Cross as part of its civilian defense program.

In collaboration with the Medical Division of the U. S. Office of Civilian Defense, the curriculum (ARC 774) has been revised to meet national defense needs; the number of hours of instruction has been reduced from 100 to 80, without sacrifice

of any essential requirements; the minimum period of time in which these 80 hours of instruction will be given has been shortened to 7 weeks; and the regulations for the organization and administration of the Nurses' Aide Corps have been modified in order to reach the desired objective.

A Civilian Defense Volunteer Office will be established by each local Office of Civilian Defense, which will serve as a clearing house for all volunteers. Those who meet the eligibility requirements for Nurses' Aides in regard to age, education, and availability will be sent to the local Red Cross chapter where they will be carefully selected for the intensive training course. The first half of the course will be given in the local Red Cross chapter house or other suitable place. After completion of this probationary period, instruction will be continued as supervised practice in a hospital which meets the requirements as a training center.

The hospitals used as training centers should be on the approved list of the American Medical Association and the American College of Surgeons; the standards of nursing service must be acceptable to a Nurses' Aide Committee set up by the local Red Cross chapter; general hospitals caring for men, women, and children should be selected; and the training center should conform to the policies and rules of the Red Cross and the U. S. Office of



## GUIDE FOR THE TRAINING OF VOLUNTEER NURSES' AIDES

Civilian Defense governing the services, duties, and assignments of the Aides. Situations meriting special considerations should be acted upon by Area Headquarters of the Red Cross. When the course is satisfactorily completed, the Red Cross will serve as a placement agency for the assignment of the Aides to hospitals, clinics, health departments, school health, and visiting nursing services. The Red Cross placement service will be guided by the local Chief of Emergency Medical Service, who will keep informed of the needs in all local hospitals, health and field nursing organizations, with the assistance of the Nurses' Aide Committee. A Red Cross certificate and pin, issued by the Volunteer Special Services at American Red Cross Area Headquarters will be awarded to the volunteers who complete the course.

### ***Requirements for the Training Course***

1. A Nurses' Aide Committee which is a subcommittee of the Volunteer Special Services must be set up in each chapter, to be responsible for maintaining standards and discipline and for supervising the service. (ARC Form 1901.)
2. The instructor for the course must be a well-qualified, registered, graduate nurse, authorized annually by the area headquarters of the Red Cross. (Qualifications and application—ARC Form 1529.)
3. Hospitals used as training centers must be on the approved lists of the American Medical Association and the American College of Surgeons. (ARC Form 1901.)
4. The new eighty (80) hour Syllabus ARC 774 is to be used.
5. Volunteers chosen to take the training must meet stated physical and educational requirements, and must agree to accept regulations concerning future service in the Volunteer Nurses' Aide Corps. (ARC Form 1239A.)
6. A maximum of thirty (30) Aides is allowed in each class.
7. The duties authorized for the service must be adhered to by the local Nurses' Aide Committee and by hospitals and organizations using the volunteers. (See ARC 775.)

8. Each Aide must work under supervision of a nurse and as assistant to a nurse at all times, and never as an independent worker. The service should not supplant that given by paid workers nor should the Volunteer Nurses' Aides be employed in hospitals and clinics to do work which can be performed by untrained volunteers or workers.
9. All Aides must take the Red Cross First Aid Course for Civilian Defense (standard 20-hour course) as soon as possible and in any case by the end of their first year of service. Those who have had a standard first-aid course in the past should take the advanced 10-hour review course.

It is expected that each chapter establishing a Volunteer Nurses' Aide Corps will adhere strictly to the nine basic requirements stated above. Because of the widely diverse situations existing in local communities, it may become necessary for some chapters through the office of their Nurses' Aide Committees to use any practical method advisable for meeting special needs.

### ***Office of Civilian Defense Responsibilities***

The responsibilities of the local Office of Civilian Defense and the local Chief of Emergency Medical Service are as follows:

1. To assist the Red Cross in recruiting and enrolling desirable applicants for training.
2. To assist the local chapters to conclude arrangements with appropriate general hospitals to serve as training centers.
3. To assist the Red Cross in organizing and maintaining a placement service so that Volunteer Nurses' Aides may continue to serve and to accumulate experience.
4. To reassign Volunteer Nurses' Aides to emergency duty if the need should arise.

### ***Nurses' Aide Committee***

Although service in the Volunteer Nurses' Aide Corps is purely a volunteer activity it is also a nursing activity and must maintain standards and discipline which will meet with the approval of the

## GUIDE FOR THE TRAINING OF VOLUNTEER NURSES' AIDES

nursing profession. To carry this responsibility each chapter will set up a Nurses' Aide Committee as a subcommittee of its Volunteer Special Services Committee to be composed of nurse and lay representatives and the local Chief of Emergency Medical Service of the Civilian Defense Council. To this Committee will be assigned the responsibility for:

1. Coordinating the Aide service with the program of the local Office of Civilian Defense.
2. Determining local policies.
3. Administering and supervising the training of the Corps.
4. Recruiting for enrollment of volunteers in cooperation with the Office of Civilian Defense.
5. Safeguarding standards.

### **Requirements for Membership in Volunteer Nurses' Aide Corps**

1. Age: Between 18 and 50 years when enrolled. Citizenship.
2. Satisfactory physical condition. (Physical examination requirements must be passed—ARC Form 1239 B.)
3. Graduation from high school or equivalent.
4. Satisfactory completion of eighty (80) hour course (ARC 774).
5. *Service must be given without remuneration.*
6. Policies and rules of Corps as defined by U. S. Office of Civilian Defense and the National Red Cross must be accepted.
7. One hundred and fifty hours of service must be given in each calendar year, preferably in a 3-month period.
8. In time of war or other national emergency, Volunteer Nurses' Aides must be prepared to serve whenever and for as long a period as needed.

It is of the utmost importance that applicants be chosen with care and made to realize that they are enrolling in a Corps which may require a great devotion to duty on their part. Much emphasis must be laid on physical fitness, emotional stability,

mental alertness, and adaptability to unexpected situations and to new ways of doing things, as well as to the absolute necessity of accepting the discipline of the Corps.

Applicants need not hesitate to become members of the Corps if they cannot leave their own communities in times of emergency. Aides will be needed on the Home Front as much as elsewhere, but they must be prepared to give generously of their time during a period of great need.

### **The Curriculum**

The Syllabus (ARC 774) is a revision of the material which has been used by instructors of Red Cross courses for Volunteer Nurses' Aides since July 1940. The instructional material is presented in outline form only. No attempt has been made to cover each subject exhaustively. It is expected that the instructor will draw upon her own knowledge and experience to elaborate on the outline and to interpret properly the subject to the class.

Volunteer Nurses' Aide Course:

Two units—Total time 80 hours.

Unit I.—Care of the Sick in the Hospital..... 34 hours.

(One hour of lecture and demonstration and one or more hours of practice daily, five days a week.)

Unit I may be given in the local Red Cross chapter house or other suitable and properly equipped room.

Unit II.—Supervised Practice in the Hospital..... 45 hours.

(Three hours a day for five days a week.)

Unit II is to be given in a hospital designated for this purpose as a training center for Volunteer Nurses' Aides.

Examination..... 1 hour.



# GUIDE FOR THE TRAINING OF VOLUNTEER NURSES' AIDES

## **Duties**

Nurses' Aides never assume independent nursing responsibilities and always work under supervision of a graduate nurse.

The authorized duties which the prescribed training and practice prepare Aides to perform are listed in Chapter Organization and Administration of Red Cross Volunteer Nurses' Aide Corps (ARC 775). These duties are subject to the approval of the individual institution or organization to which the volunteer is assigned. A partial list includes:

*In Hospitals.*—Make beds and ether beds; assemble bath materials; take care of patient's personal belongings, flowers, fruit; assist in keeping ward or room neat and in order; put away supplies; take care of linen closet; clean equipment trays, take care of rubber goods; give baths; prepare patients for meals; feed patients; take patients to and from treatment rooms; chaperon and drape patients for doctors examination; take temperature, pulse and respiration.

*In Clinics.*—Similar to above and assist in registering; undress and dress children; weigh and measure patients; keep clinic equipment clean and in order.

*In Community Health Agencies.*—Such nursing and clerical duties approved by the organization. Home visits to obtain information or give routine instructions, but not for teaching or independent nursing responsibilities. Miscellaneous duties—answer telephone, carry messages, filing, clerical work, etc.

## **Uniform and Insignia**

The uniform which is to be worn after the first 34 hours of the course (Unit I) by the Volunteer Nurses' Aides trained for service in Civilian Defense is a blue cotton jumper apron, worn over a regulation white blouse, plainly tailored and inexpensive.

An OCD insignie will be worn on the left sleeve. This consists of a red cross on the white triangle within a blue circle to indicate that the Aide has been enrolled and trained by the Red Cross for Civilian Defense.

After the course is satisfactorily completed, a cap, made of the same blue material as the uniform, with a facing of white, will be worn. Insignie will be placed on the white band, center front, and the Red Cross Volunteer Nurses' Aide pin may be worn at the neck to fasten the collar.

## ADDRESS OF NATIONAL HEADQUARTERS AND JURISDICTIONS AND ADDRESSES OF AREA OFFICES

NATIONAL HEADQUARTERS: *17th and D Streets NW., Washington, D. C.*

EASTERN AREA: *615 North St. Asaph Street, Alexandria, Virginia:*

Alabama, Connecticut, Delaware, District of Columbia, Florida, Georgia, Indiana, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Mississippi, New Hampshire, New Jersey, New York, North Carolina, Ohio, Pennsylvania, Rhode Island, South Carolina, Tennessee, Vermont, Virginia, West Virginia.

MIDWESTERN AREA: *1709 Washington Avenue, St. Louis, Missouri:*

Arkansas, Colorado, Illinois, Iowa, Kansas, Michigan, Minnesota, Missouri, Montana, Nebraska, New Mexico, North Dakota, Oklahoma, South Dakota, Texas, Wisconsin, Wyoming.

PACIFIC AREA: *Civic Auditorium, Larkin and Grove Streets, San Francisco, California:*

Alaska, Arizona, California, Idaho, Nevada, Oregon, Utah, Washington.

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